EXHIBIT 27

IN THE UNITED STATES DISTRICT COURT
FOR THE WESTERN DISTRICT OF TEXAS
WACO DIVISION

Sonos, Inc.,	§	
	§	
Plaintiff,	§	No. 6:20-cv-881-ADA
v.	§	
	§	
Google LLC,	§	
	§	
Defendant.	§	

REPLY DECLARATION OF DOUGLAS C. SCHMIDT

I, Douglas C. Schmidt, hereby declare as follows:

1.   I previously submitted a declaration dated April 27, 2021 (referred to herein as my "Opening Declaration") that contained certain opinions as to how a person of ordinary skill in the art ("POSITA") at the time of the inventions of U.S. Patent Nos. 9,967,615 ("'615 Patent") and 10,779,033 ("'033 Patent") would have understood certain claim terms. The contents of my Opening Declaration are herein incorporated by reference in their entirety.

I.   SCOPE OF ASSIGNMENT

2.   I understand that, on June 1, 2021, Google served its responsive claim construction brief ("Google's brief") along with a declaration of Dr. Christos Kyriakakis dated June 1, 2021 ("Dr. Kyriakakis' Declaration") that addressed certain claim terms found in the '615 and/or '033 Patents. Sonos has asked me to evaluate Google's brief and Dr. Kyriakakis' Declaration in connection with the '615 and/or '033 Patents and to provide my opinions in response thereto.

3.   In particular, Sonos has asked me to evaluate and respond to Dr. Kyriakakis' opinions regarding the following claim terms:

Patent	Term
'033 Patent	"data network"
'615 Patent	"local area network"
'615 Patent	"a media particular playback system"
'033 Patent	"wherein the instruction comprises an instruction"

4.   This Reply Declaration explains my analysis of, and responsive opinions to, Dr. Kyriakakis' opinions regarding the above-identified claim terms that are used in the '615 or '033 Patent. In forming my opinions, I have read and understand the claims of the '615 and '033 Patents, the specification that is common to both the '615 and '033 Patents, and each of the patents' respective file histories. I have also reviewed Google's brief, Dr. Kyriakakis' Declaration, and the materials cited therein.

5.   I reserve the right to supplement or clarify the opinions set forth herein, and if I am requested to do so, to provide additional opinions regarding the '615 and/or '033 Patents.

6.   I am being compensated at my normal hourly consulting rate of $550/hour for this matter. My compensation does not depend in any way on the nature of my opinions or the outcome of this case.

II.   SUMMARY OF OPINIONS

7.   As explained in detail herein, I disagree with Dr. Kyriakakis' analyses and opinions regarding the aforementioned claim terms of the '615 and '033 Patents. For the reasons explained in detail below and in my Opening Declaration, it is my opinion that a POSITA at the time of the inventions of the '615 and '033 Patents would have understood the above-identified claim terms as follows:

Patent	Term	POSITA's Understanding
'033 Patent	"data network"	Plain and ordinary meaning "a medium that interconnects devices, enabling them to send digital data packets to

		and receive digital data packets from each other"
'615 Patent	"local area network"	Plain and ordinary meaning "data network that interconnects devices within a limited area, such as a home or office"
'615 Patent	"a media particular playback system"	"a media playback system" (Not indefinite)
'033 Patent	"wherein the instruction comprises an instruction"	Not indefinite

8.   I understand that Sonos and/or Google may seek construction of claim terms in the '615 and/or '033 Patents other than those expressly addressed herein. I have not analyzed, and express no opinions on, the proper construction of any other claim term in the '615 or '033 Patents at this time.

III.   BACKGROUND & QUALIFICATIONS

9.   My background and qualifications are set forth in my Opening Declaration.

IV.   LEGAL STANDARDS

10.   I set forth my understanding of certain legal standards that counsel had informed me about in my Opening Declaration.

11.   I have been informed by counsel about legal standards relevant to indefiniteness because Dr. Kyriakakis opined that the terms "a media particular playback system" found in certain claims of the '615 Patent and "wherein the instruction comprises an instruction" found in certain claims of the '033 Patent are indefinite.

12.   In this regard, for starters, I understand that an issued U.S. patent is presumed to be valid, which includes a presumption that the claims are not indefinite, and that the burden is on the party challenging validity to prove by clear and convincing evidence that a claim is

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invalid. Thus, I understand that Google must prove by clear and convincing evidence that the term "wherein the instruction comprises an instruction" is indefinite.

13.   I further understand that a claim is invalid for indefiniteness if the claim, read in light of the specification and the prosecution history, fails to inform a POSITA about the scope of the claimed invention with reasonable certainty. In contrast, I understand that a claim is not invalid for indefiniteness if the patent is precise enough to afford clear notice of what is claimed and apprise the public of what is still open to them. Moreover, I understand that the claims, when read in light of the specification and the prosecution history, must provide objective boundaries for a POSITA to understand the scope of the invention.

14.   Lastly, while I understand that reasonable certainty is the applicable standard for definiteness, I also understand that a modicum of uncertainty may be tolerated and that absolute precision is not required.

15.   In connection with Dr. Kyriakakis' opinions regarding the term "wherein the instruction comprises an instruction," I have also been informed by counsel about legal standards relevant to the transitional claim term "comprising"/"comprises."

16.   Specifically, I understand that a transitional claim term such as "comprising" or "comprises" is synonymous with "including," "containing," or "characterized by," and such a transitional term is open-ended in that it does not exclude additional, unrecited elements or method steps.

V.   LEVEL OF ORDINARY SKILL IN THE ART

17.   I set forth my opinion regarding the level of ordinary skill in the art for the '615 and '033 Patents in my Opening Declaration. For convenience, I have reproduced my articulation of the proper level of ordinary skill in the art below:

[A] person of ordinary skill in the art for purposes of the '615 and '033 Patents is a person having the equivalent of a four-year degree from an accredited institution (typically denoted as a B.S. degree) in computer science, computer engineering, electrical engineering, or an equivalent thereof, and approximately 2-4 years of professional experience in the fields of networking and network-based systems or applications, such as consumer audio systems, or an equivalent level of skill, knowledge, and experience.

18.   Dr. Kyriakakis reached a different conclusion, opining that:

[A] person of ordinary skill in the art at this time would have had a bachelor's of science in electrical engineering, computer science or engineering, or a related field, and two to four years of work or research experience in the field of information networks, data communications, or multimedia systems, or a Master's degree and one to two years of experience in the same field.

Kyriakakis Dec. at ¶ 31.

19.   As is evident, Dr. Kyriakakis' articulation of the level of ordinary skill in the art is much broader than my own. For instance, Dr. Kyriakakis contends that "two to four years of work or research experience in the field of information networks, data communications, ***or*** multimedia systems" is sufficient. *Id.* I disagree for several reasons.

20.   First, the '615 and '033 Patents are directed to networked media systems that operate on local and wide area data networks. Dr. Kyriakakis expresses extremely broad views of what is encompassed by the terms "data" and "network" in the abstract, and thus, Dr. Kyriakakis' implied meanings of "information networks" and "data communications" ostensibly cover many kinds of "networks" and forms of communication not relevant to the inventions of the '615 and '033 Patents, such as a traditional analog radio broadcast and individuals talking via two cups attached by a string. *See, e.g., id.* at ¶ 62; Kyriakakis Dep. Tr. at 60:18-61:2, 152:20-155:11. In my opinion, having 2-4 years of general experience with these kinds of "networks" and/or forms of communication would not make an individual a POSITA for the '615 and '033 Patents.

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21.   Second, Dr. Kyriakakis contends that 2-4 years of experience in the field of "multimedia systems" is sufficient, which seems to be broad enough to encompass conventional multimedia systems comprised of an A/V receiver (or the like) connected to passive speakers via traditional speaker wires. But as noted above, the '615 and '033 Patents are specifically directed to **networked** media systems that operate on local and wide area data networks, which are distinctly different from conventional multimedia systems. In my opinion, having 2-4 years of experience with conventional multimedia systems alone would not make an individual a POSITA for the '615 and '033 Patents.

22.   For these reasons, it is my opinion that Dr. Kyriakakis' articulation of the level of ordinary skill in the art is overly broad, and thus incorrect. Moreover, in my opinion, Dr. Kyriakakis' use of this overly-broad level of ordinary skill in the art when interpreting the '615 and '033 Patents underlies many of the flaws in Dr. Kyriakakis' analyses and opinions set forth in his declaration. For example, as I discuss in further detail below, it is my opinion that a POSITA having the proper level of ordinary skill in the art that I articulated, reproduced above (a "proper POSITA"), would not reach the conclusions that Dr. Kyriakakis reaches with respect to "data network," nor would such a POSITA confuse an "instruction" transmitted over a data network with "program instructions" stored on a computing device's memory, as Dr. Kyriakakis did. *See, e.g.*, *id.* at ¶¶ 60, 75. In fact, given how Dr. Kyriakakis approached his evaluation of these terms, not only has Dr. Kyriakakis used too broad of a POSITA but it also almost seems as though Dr. Kyriakakis is interpreting the claim terms through the lens of a layperson that does not even meet his own POSITA articulation.

VI.   OVERVIEW OF THE '615 & '033 PATENTS

23.   I provided an overview of the '615 and '033 Patents in my Opening Declaration.

VII.   "DATA NETWORK"

Sonos's Proposed Construction	Google's Proposed Construction
Plain and ordinary meaning "a medium that interconnects devices, enabling them to send digital data packets to and receive digital data packets from each other"	Plain and ordinary meaning; no construction necessary at this time

24.   As I explained in my Opening Declaration, it is my opinion that Sonos's proposed construction is consistent with how a POSITA would have interpreted the term "data network" in the context of the '033 Patent (and '615 Patent) because it appropriately specifies that a "data network" (i) is a medium that interconnects devices, enabling the devices to both send and receive information (i.e., it enables two-way communication) (Schmidt Op. Dec. at ¶¶ 67-71) and (ii) transfers information in the form of digital data packets (Schmidt Op. Dec. at ¶¶ 79-83), which are fundamental characteristics of a "data network" in the field of networking.

25.   However, in Dr. Kyriakakis' declaration, he disagrees with Sonos's proposed construction and opines that "[i]n the context of these patents, a person of ordinary skill in the art would have understood that the general understanding of the term 'data network' does not restrict the type of data (digital or analog), the manner of transmission (packet or non-packet form), or the nature of the communication (bi-directional or unidirectional)." Kyriakakis Dec. at ¶ 60. I disagree with Dr. Kyriakakis' opinions for various reasons, as explained in further detail below.

A.   Dr. Kyriakakis' Approach Is Flawed

26.   As an initial matter, it is my opinion that Dr. Kyriakakis' approach for interpreting the term "data network" is flawed. This flaw arises because, instead of considering how a POSITA would have interpreted this term of art at the time of the invention, Dr.

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Kyriakakis approaches the interpretation of the term "data network" as a layperson might, which

I understand is an improper approach for construing patent claims.

27.   In particular, Dr. Kyriakakis' approach involves breaking the term "data network"

into its individual parts (i.e., "data" and "network") and then seeking out individual definitions of

each of those parts in isolation. *See, e.g.*, Kyriakakis Dec. at ¶¶ 50, 62. In my opinion, this is not

how a POSITA with the appropriate level of skill would interpret the term "data network"

because such a POSITA would come to the '033 Patent with the education and experience to

know that "data network" is a well-understood term of art in the field of networking. In other

words, a proper POSITA would understand that "data network" is a compound term having a

well-understood meaning in the field and would therefore know to interpret the term "data

network" as a whole consistent with that well-understood meaning in the field, as opposed to

breaking "data network" up into its constituent parts.

28.   Because Dr. Kyriakakis utilizes a flawed approach to interpret the term "data

network," he incorrectly concludes that the term simply refers to any "network" that can carry

data in any form. *See, e.g.*, Kyriakakis Dec. at ¶¶ 50, 62. In my opinion, no proper POSITA

would reach such a simplistic conclusion given that the term "data network" was (and still is) a

term of art in the field of networking that has a well-understood meaning. *See, e.g.*, Kyriakakis

Dep. Tr., Ex. 2 at slide 6 (Jan. 24, 2004 presentation for Cornell University "Computer

Networks" class explaining a "data network . . . is NOT 'a network that carries data'") (copy

attached as App'x O) (original available at http://www.cs.cornell.edu/courses/cs419/2005sp/419-

sp05-01-intro-v2.pdf).

29.   Dr. Kyriakakis' deposition testimony confirms that his approach for interpreting

the term "data network" is flawed, as demonstrated by Dr. Kyriakakis broadly asserting that a

POSITA would consider each of the following a "data network" (and/or a "local area network," which Dr. Kyriakakis concedes is a type of a "data network"[1]):

- devices interconnected via any "copper" wire, including "audio cables," "speaker cables," "coaxial cables" (*see, e.g.*, Kyriakakis Dep. Tr. at 28:17-29:11);
- an analog "voice network," including a "public switch[ed] telephone network," analog "cellular networks," a "walkie-talkie network" (*see, e.g.*, *id.* at 36:3-25, 37:7-9, 38:6-23, 49:10-16);
- an "infrared remote that sends infrared signals to a TV" (*see, e.g.*, *id.* at 53:20-24); and
- talking on two cups with a string between them (*see, e.g.*, *id.* at 60:18-61:2, 152:20-155:11).

30.   The flaws in Dr. Kyriakakis' approach and conclusion is further illustrated by the fact that, under Dr. Kyriakakis' simplistic interpretation of "data network," the meaning of that term would be no different than the meaning of the broader term "network." However, a POSITA having the proper level of skill would clearly understand that "***data* network**" is a narrower term that has a different (and more specific) meaning than the broader term "network." Dr. Kyriakakis' interpretation fails to preserve this well-understood distinction between the terms "data network" and "network" and has the effect of rendering the word "data" in the term "data network" meaningless, which I understand to be an improper practice when interpreting patent claims.

B.   Dr. Kyriakakis' Analysis Confirms "Data Networks" Are Digital

31.   While Dr. Kyriakakis argues that "the term 'data network' does not restrict the type of data (digital or analog)[or] the manner of transmission (packet or non-packet form)" (Kyriakakis Dec. at ¶ 60), his own analysis confirms that a POSITA would understand that a

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[1] Kyriakakis Dep. Tr. at 55:22-56:6 ("Well, a local area network is a subset of the data networks. . . . A local area network is a data network.") (copy attached as App'x P).

"data network" carries information in the form of digital data packets, as opposed to in an analog form.

32.   In this regard, as Dr. Kyriakakis acknowledges, a "data network" carries data in "discrete units" that are referred to as "packets." Kyriakakis Dec. at ¶ 63 ("'In the generic sense,' packets 'refer[] to the manner in which data are organized into *discrete units* for transmission and switching through a *data network*.'") (bracket original).[2, 3] And, as Dr. Kyriakakis acknowledges, it is only "digital data" that is represented in *discrete* form, whereas "analog data" is represented in continuous form. *Id.* at ¶ 62 ("Digital data is 'data represented in *discrete*, *discontinuous* form, as contrasted with analog data represented in *continuous* form.'").

33.   Thus, Dr. Kyriakakis' own analysis confirms that, even in the "generic sense," a "data network" carries data in "discrete units" (referred to as "packets"), which are digital in form as opposed to analog. The examples of networks that Dr. Kyriakakis identifies that do not carry information in digital form fail to refute this conclusion. *See* Kyriakakis Dec. at ¶¶ 62, 64.

34.   For instance, Dr. Kyriakakis identifies circuit-switched networks, telephone networks, and analog cellular networks,[4] but Dr. Kyriakakis fails to identify any evidence that a proper POSITA would have interpreted the term "data network" at the time of the invention to refer to any of these types of networks. In fact, neither the *Computer World* nor the *No Jitter* article cited by Dr. Kyriakakis uses the term "data network" to refer to an "analog cellular network" or "analog phone network." Likewise, Dr. Kyriakakis fails to point to any evidence

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[2] All emphases is added unless otherwise indicated.
[3] Notably, the dictionary that Dr. Kyriakakis approvingly cites goes on to explain that, "[i]n a technology-specific sense, a packet is a data unit in an internetwork, such as the Internet or other packet-switched network . . . ." *Id.*, Ex. G (Webster's New World Telecom Dictionary (2008)).
[4] The *Computer World* article focuses on the phasing out of "analog cellular networks."

showing that a POSITA would have used the term "data network" to refer to a circuit-switched or telephone network. *See* Kyriakakis Dec. at ¶ 64.

35.   It is not surprising to me that Dr. Kyriakakis was unable to identify evidence showing that a POSITA would have used the term "data network" to refer to circuit-switched networks, telephone networks, or analog cellular networks because these are all examples of what a POSITA would commonly refer to as a "voice network" – which is the primary class of networks that the term "data network" is meant to distinguish from. Put another way, a POSITA would understand that "networks" for carrying information between devices generally fall into two primary classes of networks: (i) *voice* networks (sometimes referred to as "circuit networks") that use circuit switching and carry information in the form of analog signals and (ii) *data* networks (sometimes referred to as "packet networks") that use packet switching and carry information in the form of digital data packets. *See, e.g.*, App'x O at slide 6 (explaining that "'[d]ata network' is often a euphemism for 'packet network' and 'voice network is often a euphemism for 'circuit network'"). These definitions are confirmed by a variety of technical sources, including some cited approvingly by Dr. Kyriakakis and identified by Google.

36.   For example, *Newton's Telecom Dictionary* (2003) (found in Exhibit D to Dr. Kyriakakis' declaration) states that "data" is "[t]ypically anything *other than voice*."

37.   As another example, the *Packet Broadband Network Handbook* (2004) describes a "local area network as a high-speed *data network* that covers a relatively small geographic area" that is "used to carry *data traffic as opposed to voice traffic*." SONOS-SVG2-00018673 at 76 (attached to Schmidt Op. Dec. as App'x G); *see also id*. at 74 (explaining that "[b]efore packet networks, communications technology used circuit-switched telephone networks with

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dedicated, analog circuits," and that "[p]acket networks based on packet switching technologies represent a radical departure").

38.   As yet another example, *Microsoft Computer Dictionary* (5th ed. 2002) defines "data network" as "[a] network designed for transferring data encoded as digital signals, ***as opposed to a voice network***, which transmits analog signals." Kyriakakis Dep. Tr., Ex. 3 (copy attached as App'x Q).

39.   Dr. Kyriakakis attempts to dismiss the fact that a POSITA at the time of the invention (2011) would know that a "voice network" (e.g., a circuit-switched or telephone network) is distinctly different from a "data network" by pointing to certain passages in *Data & Computer Communications* (6th Ed. 2000). *See* Kyriakakis Dec. at ¶¶ 70-71. But these passages provide a history of wide-area-network technology and its evolution over the years explaining that, traditionally (before the year 2000), WANs had been implemented using circuit switching or packet switching,[5] but "[m]ore recently" (as of the year 2000), WANs had been implemented using frame relay and ATM technology, both of which are evolved versions of traditional packet switching. *See* SONOS-SVG2-00018715 at 18-20. When placed in this proper context, the passages in *Data & Computer Communications* do not support Dr. Kyriakakis' implications that ***all*** wide area networks from ***all*** time were considered to be "data networks" or that a POSITA in 2011 would have interpreted the term "data network" to refer to a traditional circuit-switched or telephone network.

40.   Dr. Kyriakakis also identifies "speakers and other devices" connected via RCA cables that can carry video and audio signals as somehow supporting his assertion that "some

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[5] Notably, *Data & Computer Communications* explains that the packet switching approach is "quite different" from the circuit switching approach that was most commonly used in conventional telephone networks. *See* SONOS-SVG2-00018715 at 18-19.

data networks . . . do not" transfer digital data packets. Kyriakakis Dec. at ¶ 64. But Dr.

Kyriakakis fails to identify any evidence that a POSITA at the time of the invention would have

interpreted the term "data network" to encompass RCA cables, and in my opinion, a POSITA

having the appropriate level of skill would not have considered standard RCA cables to even be a

"network" – let alone a "data network." My opinion is confirmed by the fact that the Wikipedia

page that Dr. Kyriakakis himself cites does not even refer to RCA cables as amounting to a

"network," much less a "data network."

41.   Lastly, Dr. Kyriakakis cites to the disclosures of two patent publications, U.S.

Patent No. 6,829,603 filed in February 2000 and U.S. Patent Publ. No. 2003/0087636 filed in

November 2001, because each of these patent publications has a passing reference to the phrase

"analog data network." As an initial matter, I note that neither patent publication is listed on the

face of the '033 Patent as cited prior art, and thus, it is my understanding that neither one is

considered part of the '033 Patent's intrinsic evidence.

42.   Given the sparse discussion in connection with this phrase in each of these patent

publications, it is unclear to me what the respective inventors meant by the phrase "analog data

network." Regardless, in my opinion, these one-off uses of the phrase "analog data network" in

unrelated patent publications are inconsistent with how a POSITA would have understood the

plain and ordinary meaning of the term "data network" in 2011, as demonstrated by the

overwhelming intrinsic and extrinsic evidence for the '033 Patent that I discussed before.

C.   Dr. Kyriakakis Reads in Limitations to Two-Way Communication

43.   Dr. Kyriakakis asserts that "[a] person of ordinary skill in the art would

understand the plain and ordinary meaning of 'data network' encompasses both unidirectional

and bidirectional data networks such that Dr. Almeroth and Schmidt's contention that a network

requires that a device must be able to send and receive data from another device is also incorrect." Kyriakakis Dec. at ¶ 66. I disagree with this assertion in Dr. Kyriakakis' declaration as well, which is flawed for various reasons.

44.   For starters, Dr. Kyriakakis once again improperly focuses on the word "network" in isolation instead of the whole term "data network." Thus, even assuming Dr. Kyriakakis were correct that "[t]here are many types of *networks* that do not require a networked device to both send and receive data from another device" (Kyriakakis Dec. at ¶ 66), this statement is not directed to "data networks" in particular and thus, is irrelevant.

45.   Moreover, Dr. Kyriakakis mischaracterizes Sonos's construction of "data network" and improperly reads in limitations that are not required. In particular, Sonos's construction is "a medium that interconnects devices, enabling them to send digital data packets to and receive digital data packets from each other," and in my Opening Declaration, I used the phrase "two-way communication" as a shorthand to refer to the fact that a "data network" enables devices to both send and receive data. Dr. Kyriakakis morphs this characteristic of enabling devices to both send and receive data to require (i) *direct* two-way communication between the devices and (ii) specific *directionality* of signal flow through the data network, neither of which is required by Sonos's construction.

46.   For instance, Dr. Kyriakakis asserts that "networks such as token-ring networks do not have the architecture described by Dr. Almeroth and Schmidt" because "no device both sends and receives data *directly* to and from another device." Kyriakakis Dec. at ¶ 66.[6] But there

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[6] Without any explanation whatsoever, Dr. Kyriakakis asserts that, "[a]s the IEEE explained in its 'IEEE Standard for Local and Metropolitan Area Networks: Overview and Architecture,' networks such as token-ring networks do not have the architecture described by Dr. Almeroth and Schmidt. Ex. I." Kyriakakis Dec. at ¶ 66. But I have seen nothing in that document (and Dr.

is nothing in Sonos's proposed construction that requires devices to be able to ***directly*** send data

to and ***directly*** receive data from one another.

47.   Moreover, contrary to Dr. Kyriakakis' assertion otherwise, it is my opinion that a

proper POSITA would understand that a token-ring network does indeed enable devices to both

send and receive data. In this respect, a POSITA would understand that, although the signal flow

in a token-ring network typically travels in one direction (e.g., clockwise), each device on the

network can both send and receive data. I have illustrated this functionality below in an

annotated version of the token-ring-network diagram included in the *Encyclopedia of Computer*

Science and Technology (2009).

48.   As shown, a token-ring network architecture enables the computer that I labeled

"#1" to both send data (represented by the red arrow) to the computer that I labeled "#2" and

receive data (represented by the blue arrow) from computer #2, and thus, meets Sonos's

proposed construction of "data network" because it is "a medium that interconnects devices,

enabling them to ***send digital data packets to*** and ***receive digital data packets from*** each other."

Kyriakakis failed to cite to anything specific) that is inconsistent with Sonos's proposed
construction for "data network."
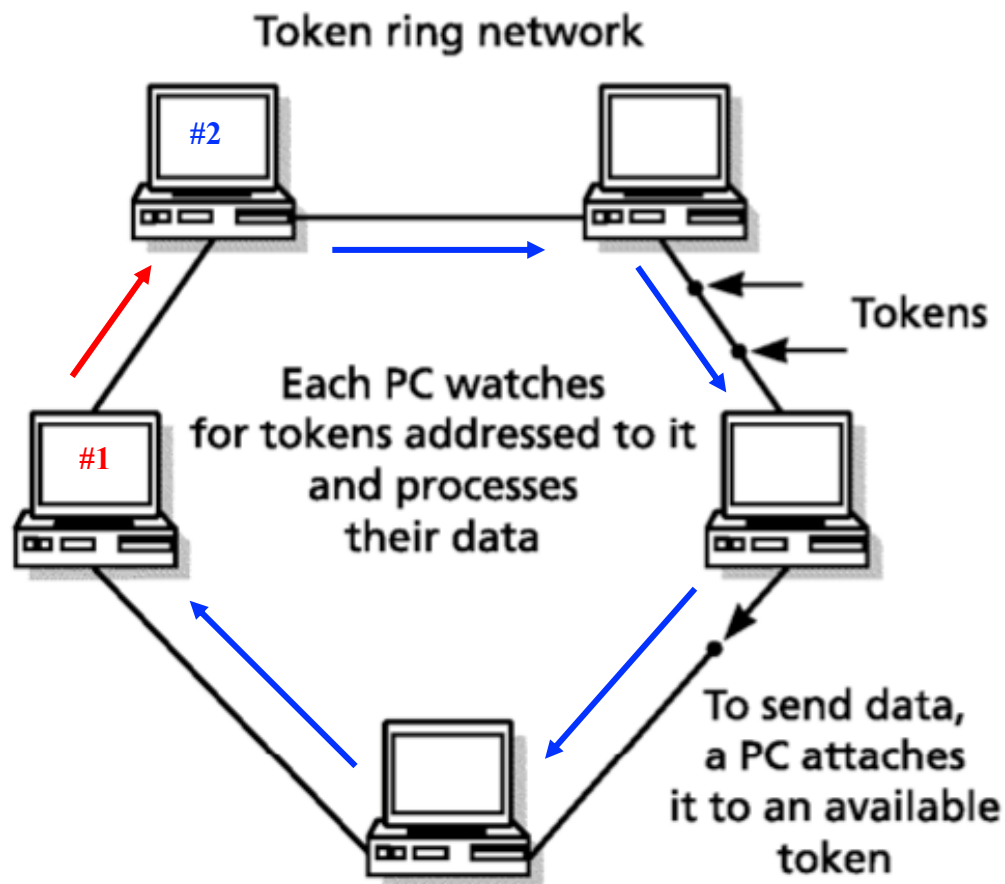
Token ring network

SONOS-SVG2-00018402 at 406 (attached to Schmidt Op. Dec. as App'x L); *see also* SONOS-SVG2-00018673 at 94-95 (describing how devices send and receive information in a token ring network) (attached to Schmidt Op. Dec. as App'x G).

49.   Based on his view that Sonos's proposed construction includes a "directionality" requirement, Dr. Kyriakakis also suggests that there are other "unidirectional" networks that amount to a "data network" that Sonos's proposed construction would exclude. *See* Kyriakakis Dec. at ¶ 67. But as I explained above, Sonos's proposed construction does not have a "directionality" requirement. Regardless, Dr. Kyriakakis mischaracterizes the "[v]arious publications" that he cites and these purported "unidirectional" data networks.

50.   For instance, Dr. Kyriakakis refers to U.S. Patent No. 6,081,907 ("Witty"),[7] but

the passages that he cites confirm that Witty does ***not*** equate "broadcast or multicast networks,"

which Witty refers to as "unidirectional," to a "data network." *See* Witty at 1:7-2:67. Instead,

Witty explains that "conventional computer networks" -- also referred to by Witty as "data

networks" -- allow "data communication in both directions between servers and clients" and the

data is "typically packetized and sent over the network in individual packets." *Id.* at 1:16-32:

> Conventional ***computer networks*** are bi-directional, allowing ***data communication in both directions between servers and clients***. Transmitting data over these bi-directional ***data networks*** has been a ***mainstay of computer technology*** for many years and the communication protocols are well established. . . . ***Digital data***, whether transmitted over a wire-based distribution network (e.g., local area network, wide area network, cable, etc.) or a wireless distribution network (e.g., satellite, RF, paging, etc.), is typically ***packetized*** and sent over the network in individual packets.

51.   Witty itself departs from the traditional "data network" and proposes a system that

"facilitates transmission of data packets from a content server to multiple clients over a

unidirectional network." *Id.* at 1:64-66. In describing this system, Witty repeatedly and

uniformly distinguishes "data network 28" -- which "represents various types of networks,

including the Internet, a LAN (local area network), a WAN (wide area network), and the like" --

from unidirectional "broadcast network 30," as shown in Figure 1. *Id.* at 3:13-40, FIG. 1.

Moreover, I see no instance where Witty refers to unidirectional "broadcast network 30" with the

well-understood term "data network" in the field of networking. Thus, contrary to Dr.

Kyriakakis' suggestion, Witty actually provides further support for Sonos's proposed

construction of "data network" because it demonstrates that a POSITA would understand a "data

network" enables devices to engage in ***two-way*** communication of ***digital data packets***.

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[7] I note that Witty is not listed on the face of the '033 Patent as cited prior art, and thus, it is my understanding that it is not considered part of the '033 Patent's intrinsic evidence.

52.   In connection with his opinion that "data networks" are not restricted to "bi-directional data networks," Dr. Kyriakakis also makes the following statement regarding "data diodes":

> [T]hose of skill in the art recognized that networks may include "data diodes" (sometimes referred to as "unidirectional" gateways) to enforce data transfer in one direction between segments or devices of a network for example to provide additional security for the network. Ex. G (Okhravi et al., Data Diodes in Support of Trustworthy Cyber Infrastructure) at § 2 ("Data diodes provide a physical mechanism for enforcing strict unidirectional communication between two networks."), Fig. 2 (illustrating networks connected by data diode)."

Kyriakakis Dec. at ¶ 67.

53.   But Dr. Kyriakakis' reliance on the *Data Diodes in Support of Trustworthy Cyber Infrastructure* paper appears to be misplaced. For starters, I see no reference in this paper to the term "data network," much less a definition of what that term means.

54.   Moreover, it is my opinion that the fact that a "data diode" could be used to enforce "unidirectional communication **between two networks**" does not somehow mean that the well-understood term "data network" does not refer to a medium that enables two-way communication between devices.

55.   In my opinion, the substance of the *Data Diodes in Support of Trustworthy Cyber Infrastructure* paper also shows that a POSITA would not turn to a discussion of "data diodes" to interpret the meaning of the term "data network" in the context of the '033 Patent. For instance, the paper discusses the use of "data diodes" as a security mechanism when establishing "[i]nterconnections between process control networks and enterprise networks" of "industrial control systems," which is a distinctly different context from the context of the '033 Patent (i.e., a networked media playback system).

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56.   Thus, it is my opinion that a POSITA would not find Dr. Kyriakakis' discussion

of "data diodes" to be relevant at all to interpreting the meaning of "data network" in the context

of the '033 Patent.

D.   Dr. Kyriakakis' Interpretation of the Term "Data Network" Is So Broad that it Would Read on Traditional Speaker Wires

57.   As I explained in my Opening Declaration, Sonos's patents are directed to a

networked media system comprised of zone players that take the form of digital data processing

devices connected to a "data network," which was specifically intended to advance upon a

conventional media system comprised of an audio/video receiver (AVR) (or the like) connected

to passive speakers via speaker wire. *See, e.g.*, '615 Patent at 6:52-60 ("The actions of grouping,

consolidation, and pairing are preferably performed through a control interface, such as using

controller 130, and ***not by physically connecting and re-connecting speaker wire***, for example,

to individual, discrete speakers to create different configurations. As such, certain embodiments

described herein provide a more flexible and dynamic platform through which sound

reproduction can be offered to the end-user."); *see also, e.g.*, U.S. Patent 7,571,014[8] at 1:24-2:13

(Sonos patent describing shortcomings of conventional, "hard-wired" "multi-zone audio

systems" that the inventors of the patent innovated over).

58.   However, as I explained above, Dr. Kyriakakis is interpreting the term "data

network" so broadly that it would read on virtually any type of communication medium that

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[8] Because U.S. Patent 7,571,014 is cited on the face of each of the '615 and '033 Patents, it is my understanding that that patent is considered part of the intrinsic evidence of each of the '615 and '033 Patents.

carries data – including communication mediums that a POSITA would not even consider to be a "network."

59.   For instance, in addition to opining that voice networks for carrying analog signals are "data networks," Dr. Kyriakakis has gone as far as to opine that traditional RCA cables for carrying analog video and audio signals within a conventional media system amount to a "data network." *See* Kyriakakis Dec. at ¶ 64. In a similar vein, Dr. Kyriakakis has also opined that the transmission medium for carrying an infrared signal from an infrared remote control to a TV would qualify as a "local area network" (which is commonly understood to be a specific type of "data network" that spans a limited area). *See* Kyriakakis Dec. at ¶ 51. Worse yet, during his deposition, Dr. Kyriakakis testified that "two cups on a string" used by two individuals to communicate amounts to a "data network," albeit "[n]ot a very sophisticated one":

> **Q**: What if I just had, you know, *two cups on a string* and I used that communicate with [attorney's second chair], who is right by me, *is that on a data network*?
> **A**: That's a bit of an extreme example, but if your voice carried over the string and the string was carefully selected and there was no background noise, yeah, it's data. Your data is getting across to somebody else to another device. *Not a very sophisticated one, but yes*.

Kyriakakis Dep. Tr. at 60:18-61:2.

60.   Under the same flawed logic that Dr. Kyriakakis uses to conclude that voice networks, RCA cables, unidirectional infrared transmissions, and cups connected by a string would all qualify as "data networks," traditional speaker wires for carrying analog audio signals within a conventional media system would likewise qualify as a "data network" – which would negate the clear distinction that Sonos has drawn between the conventional media systems of the prior art and the networked media systems that are the subject of Sonos's patents. In my opinion, this provides yet another reason why Dr. Kyriakakis' interpretation of "data network" cannot be correct.

E.   Dr. Kyriakakis Ignores the Intrinsic Evidence

61.   In my Opening Declaration, I explained how the specification of the '033 Patent uniformly describes the term "data network" in a manner that is consistent with how a proper POSITA would have interpreted this term at the time of the invention -- namely, the disclosure of the '033 Patent uniformly describes a "data network" (i) as interconnecting devices and enabling the devices to both send and receive information and (ii) as transferring information in the form of digital data packets. *See, e.g.*, Schmidt Op. Dec. at ¶¶ 32-37, 43-48, 63-66, 74-77.

62.   Tellingly, Dr. Kyriakakis did not dispute this in his declaration and was unable to identify a single portion of the '033 Patent's specification (or any other part of the '033 Patent's intrinsic evidence) to support his opinion that "data network" has a plain and ordinary meaning that is broader than that proposed by Sonos. In fact, Dr. Kyriakakis' "data network" section fails to even discuss the teachings of the '033 Patent or any other part of the '033 Patent's intrinsic evidence. *See* Kyriakakis Dec. at ¶¶ 60-73. This is unsurprising given that the '033 Patent uniformly describes the term "data network" in the context of interconnecting digital data processing devices. *See, e.g.*, '615 Patent at 8:4-39.

63.   In my opinion, the fact that Dr. Kyriakakis ignores the '033 Patent's intrinsic evidence provides yet another reason why Dr. Kyriakakis' interpretation of "data network" cannot be correct.

F.   Conclusions Regarding Dr. Kyriakakis' "Data Network" Opinions

64.   In conclusion, I disagree with virtually all of Dr. Kyriakakis' analyses and opinions regarding the proper interpretation of the term "data network." From the outset, Dr. Kyriakakis approaches his interpretation of the term "data network" in the same way that a layperson might approach it, as opposed to how a proper POSITA would. With that flawed

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starting point, Dr. Kyriakakis ignores the intrinsic evidence of the '033 Patent and focuses

exclusively on extrinsic evidence that rarely even uses the term "data network" and fails to

provide any insight as to how a POSITA having the proper level of skill would understand the

plain and ordinary meaning of the term "data network."

65.   As a result, Dr. Kyriakakis does not even attempt to dispute my analysis and

opinions regarding the '033 Patent's intrinsic evidence, which discloses a "data network" that

enables devices to both send and receive information in the form of digital data packets.   Most

tellingly, Dr. Kyriakakis never points to anything in the '033 Patent's intrinsic evidence that

supports Dr. Kyriakakis' improperly broad interpretation of the term "data network."

VIII.   "LOCAL AREA NETWORK"

Sonos's Proposed Construction	Google's Proposed Construction
Plain and ordinary meaning "data network that interconnects devices within a limited area, such as a home or office"	Plain and ordinary meaning; no construction necessary at this time

66.   As I explained in my Opening Declaration, the term "local area network" is a

term of art, and it is my opinion that Sonos's proposed construction of "local area network" is

consistent with how a POSITA would have interpreted the plain and ordinary meaning of that

term of art in the context of the '615 Patent (and '033 Patent) because it appropriately specifies

that a "local area network" (i) is a "*data network*" as opposed to just *any* type of "network," and

(ii) interconnects devices within a *limited* geographic area, which are fundamental characteristics

of a "local area network" in the field of networking.

67.   Dr. Kyriakakis appears to agree with me that the term "local area network" is a

term of art and that it should be assigned its plain and ordinary meaning. *See, e.g.*, Kyriakakis

Dep. Tr. at 48:15-16. However, while Dr. Kyriakakis states that "local area network" "requires

no construction" because "the term 'local area network' does not have any special meaning" in

the '615 Patent (Kyriakakis Dec. at ¶ 49), his analyses and opinions make it clear that he is

interpreting "local area network" contrary to how a proper POSITA would have interpreted that

term at the time of the invention.

68.   For instance, Dr. Kyriakakis opines that "[a] LAN is *merely* a local area network,

and like most networks, it can be analog or digital," and he also fully incorporates by reference

his analysis of the term "data network" into his analysis of the term "local area network." *Id.* at ¶

50. These statements confirm that Dr. Kyriakakis used the same flawed approach for

interpreting "local area network" that he did for "data network." In particular, instead of

considering how a POSITA would have interpreted this term of art as a whole, Dr. Kyriakakis

looks to how a layperson might interpret the words "local area network."

69.   As a result of this improper approach, Dr. Kyriakakis appears to be interpreting

the term "local area network" so broadly that it would encompass any communication medium

that can carry data in any form – which is flawed for all of the same reasons I discussed above in

connection with the term "data network" (which I also incorporate here). *See also, e.g.*,

Kyriakakis Dep. Tr. at 152:25-155:11 (Dr. Kyriakakis testifying that the term "local area

network" covers two cups connected via a string as long as the string is not stretched out to span

a wide area).

70.   As with his opinion that a "data network" can be a "network" that carries data in

analog form, Dr. Kyriakakis fails to support his opinion that "a local area network . . . can be

analog" with any citation to the '615 Patent's intrinsic record or any extrinsic evidence from the

time of the invention where a "local area network" (or "LAN") is described as carrying

information in analog form, as opposed to digital. *See* Kyriakakis Dec. at ¶¶ 50, 61-64.

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71.   On the other hand, in my Opening Declaration, I cited and discussed a variety of both intrinsic and extrinsic evidence confirming that a "local area network" or "LAN" transfers information in digital form, **_not_** analog form. *See, e.g.*, Schmidt Op. Dec. at ¶¶ 33-37, 74-83, 90-91. For example, the '615 Patent describes the transmission and reception over local "data network 128" -- which a POSITA would understand represents a LAN (*see, e.g.*, '615 Patent at 10:64-66, 16:1-8, FIG. 1) -- of audio information in the form of "packets," which a POSITA would readily understand is a digital form, **_not_** an analog form. *Id.* at 7:37-50. As another example, the *Packet Broadband Network Handbook* explains that a "LAN is a type of broadband **_packet_** access network" and that "[t]he physical layer [of the LAN protocols] is primarily concerned with the transmission medium and its physical characteristics for **_digital_** signal transmission." SONOS-SVG2-00018673 at 76.

72.   Relying on his flawed interpretation that a "local area network" encompasses any communication medium that can carry data in any form, Dr. Kyriakakis goes as far as to say that "an infrared remote sending a signal to a TV" amounts to a coupling over a "local area network." *See* Kyriakakis Dec. at ¶ 51. However, Dr. Kyriakakis fails to cite anything in the '615 Patent's intrinsic record or any extrinsic evidence to support this position, and in my opinion, a POSITA would not consider the one-way transmission of an infrared signal from an infrared remote control to a TV to be over a "network" of any kind – let alone over a "local area network."

73.   In his declaration, Dr. Kyriakakis also disagreed with my opinion that "a POSITA would have understood at the time of the invention that two devices communicatively coupled to one another only by way of an Internet connection would not be communicatively coupled by way of a 'local area network.'" Schmidt Op. Dec. at ¶ 88; Kyriakakis Dec. at ¶ 51. In other words, Dr. Kyriakakis seems to suggest that the term "local area network" could cover devices

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that are connected only by way of the Internet, which is directly contrary to how a POSITA would understand the term "local area network." Indeed, it is well understood to a POSITA that a "local area network" has a maximum range that spans only a limited geographic area (e.g., a home or office), which distinguishes it from a "wide area network" that spans a large geographic area (e.g., multiple cities, a state, country or globe), and it is also universally understood by a POSITA that the Internet is a "wide area network" and not a "local area network." *See, e.g.*, Schmidt Op. Dec. at ¶¶ 50-51, 93-96; *see also, e.g.*, App'x R at ¶¶ 18-20 (Google expert from ITC action opining that a POSITA would understand that a "LAN" is "a network that allows for communication amongst two or more devices in a ***geographically limited area*** . . . ."). Thus, in my opinion, a POSITA would never consider devices that are only connected by way of the Internet to be coupled via a "local area network" – that is, unless those devices were additionally connected via an entirely separate data network spanning a limited geographic area. Dr. Kyriakakis refusal to acknowledge even this universally-accepted characteristic of a "local area network" improperly renders the words "local area" meaningless, and serves as yet another reason why I disagree with his interpretation of "local area network."

74. In addition to his erroneous suggestion that the term "local area network" could cover devices that are only connected by way of the Internet, Dr. Kyriakakis' takes issue with the portion of Sonos's construction of "local area network" specifying that it spans "a limited area, such as a home or office." However, I disagree with Dr. Kyriakakis for several reasons.

75. To begin, Dr. Kyriakakis' opinions regarding the "limited area" aspect of Sonos's proposed construction appears to be premised on an assumption that it requires the "limited area" to be a "home or office" and nothing else, which is not consistent with how I understand Sonos's proposed construction. Rather, it is my understanding that, consistent with the well-understood

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meaning of "local area network," Sonos's use of the phrase "such as a home or office" is simply meant to provide some non-limiting, illustrative examples of the kinds of "limited areas" that may be spanned by a "local area network."

76.   Moreover, I disagree with Dr. Kyriakakis' assertions that (i) "Dr. Schmidt glosse[d] over the intrinsic evidence," (ii) "Dr. Schmidt has not pointed to any passage in the '615 specification which equates local area network with a limited area such as a home or office," and (iii) "none of the passages he points to actually contrast a local area network to ''cloud,' 'remote,' and 'Internet.''" *Id.* at ¶ 52. All three of these assertions are incorrect.

77.   As to the first assertion, I provided a detailed explanation of the '615 Patent's intrinsic evidence with respect to "local area network" in my Opening Declaration showing how the '615 Patent's disclosure confirms that the term "local area network" refers to one type of a "data network" and that one type of a "data network" interconnects devices within a limited area, such as a home or office. *See, e.g.*, Schmidt Op. Dec. at ¶¶ 32-38, 46-48, 64-66, 74-77, 92-95.

78.   As to the second assertion, I disagree with Dr. Kyriakakis implication that, for Sonos's construction to be correct, the specification of the '615 Patent must have a passage that expressly "equates local area network with a limited area such as a home or office" (Kyriakakis Dec. at ¶ 52) in view of the fact that it is already well understood to a POSITA that a "local area network" refers to a data network that spans a limited area. Schmidt Op. Dec. at ¶¶ 50-51, 93-96; *see also, e.g.*, App'x R at ¶¶ 18-20 (Google expert from ITC action opining that a POSITA would understand that a "LAN" is "a network that allows for communication amongst two or more devices in a ***geographically limited area*** . . . ."). Regardless, Dr. Kyriakakis is incorrect because, as I discussed in my Opening Declaration, the '615 Patent does expressly equate a

"local area network" with a limited area. '615 Patent at 10:64-66 ("In general, an Ad-Hoc (or

'spontaneous') network is a *local area network* or other *small* network . . . .").

79.   As to the third contention, Dr. Kyriakakis is factually wrong because, as I

discussed in my Opening Declaration, the '615 Patent does expressly "contrast a local area

network to ''cloud,' 'remote,' and 'Internet.''" For instance, the '615 Patent teaches:

> A connection between the third-party application and the *local* playback device
> (e.g., Sonos ZonePlayer^{TM}) can be direct over a *local area network (LAN)*, *remote*
> through a proxy server in the *cloud*, and so on. A *LAN* delivery approach may be
> easier to integrate into 'native' applications (e.g., applications written for iOS or
> Android), and a *proxy server* approach may be easier for third party applications
> that are browser-based, for example.

'615 Patent at 16:1-8; *see also, e.g.*, 16:13-15 ("Information can be passed *locally*, *rather than*

through the Internet, for example."). Also, as I mentioned above, it is universally understood

by POSITAs that the term "local area network" does not encompass the Internet, which is the

prototypical example of a "wide area network."

80.   In conclusion, Dr. Kyriakakis' opinions make it clear that, despite the term's well-

understood meaning in the field of networking, he is improperly interpreting "local area

network" as a layperson might instead of how a proper POSITA would. This misinterpretation is

best exemplified by Dr. Kyriakakis' statement that "like most networks, [a 'local area network']

can be analog or digital," his deposition testimony that *two cups on a* relatively short *string*

amounts to a "local area network," as well as his disagreement with my opinion set forth in my

Opening Declaration that "a POSITA would have understood at the time of the invention that

two devices communicatively coupled to one another *only* by way of an *Internet* connection

would not be communicatively coupled by way of a 'local area network.'" *See* Kyriakakis Dec.

at ¶¶ 50-51; Kyriakakis Dep. Tr. at 152:25-155:11.

IX.   "A MEDIA PARTICULAR PLAYBACK SYSTEM"

81.   As I explained in my Opening Declaration, it is my opinion that a POSITA would understand that (i) the phrase "a media particular playback system" found in dependent claims 3, 15, and 26 of the '615 Patent contains an obvious error, (ii) the face of the '615 Patent makes clear that the only reasonable correction for this error is to remove the word "particular" from the phrase, and (iii) there is nothing in the prosecution history suggesting any other reasonable correction should apply. In this regard, as I explained in my Opening Declaration, the modifier "media particular" before "playback system" is non-sensical (because it clearly contains a typographical error) and does not reflect how a POSITA would intentionally try to impart specific meaning to the phrase "playback system." *See, e.g.*, Schmidt Op. Dec. at ¶¶ 102, 109.

82.   On the other hand, Dr. Kyriakakis contends that the phrase "a media particular playback system" "has multiple reasonable interpretations" and "a POSITA would not be able to determine which of those reasonable interpretations is correct." Kyriakakis Dec. at ¶ 54. I disagree.

83.   For instance, Dr. Kyriakakis contends that, instead of the inclusion of "particular" in the phrase "media particular playback system" being a typographical error, the phrase "media particular playback system" could refer to a "playback system that can only play particular media formats[or] particular media types . . . ." Kyriakakis Dec. at ¶ 54. I disagree for several reasons.

84.   As an initial matter, it is my opinion that no POSITA would reasonably interpret the language a "media particular playback system" to mean a "playback system that can only play particular media formats[or] particular media types," which requires a POSITA to flip the recited words "media particular" around to instead read as "particular media." In this respect, if a POSITA intended to refer to a particular format or type of media, as Dr. Kyriakakis contends,

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the POSITA would have used the phrase "particular media," not "media particular," which is unnatural and nonsensical.

85.   Moreover, it is my opinion that none of Dr. Kyriakakis' alternative interpretations would be reasonable to a POSITA *having read* the claims and specification of the '615 Patent. As to Dr. Kyriakakis' first alternative interpretation of the phrase "media particular playback system" possibly referring to a "playback system that can only play particular media formats," Dr. Kyriakakis points to no teaching whatsoever in the '615 Patent's specification of a "playback system" that only plays "particular media formats" (e.g., MP3, FLAC, MPEG-4, etc.[9]). I have reviewed the '615 Patent's specification and have been unable to identify any support for such a specific type of "playback system" either. In my opinion, it would be unreasonable for a POSITA that has read the '615 Patent's specification to interpret the phrase "media particular playback system" in a manner that is not supported by the '615 Patent itself, as Dr. Kyriakakis' first alternative interpretation would require.

86.   As to Dr. Kyriakakis' second alternative interpretation of the phrase "media particular playback system" possibly referring to a "playback system that can only play . . . particular media types" but not others, this second alternative interpretation is clearly unreasonable given the remaining language of claims 3, 15, and 26 of the '615 Patent.

87.   For instance, each of these claims further recites "wherein the particular playback device *playing back the retrieved multimedia content* comprises the particular playback device and the at least one additional playback device *playing back the multimedia content in synchrony*." If, as Dr. Kyriakakis contends, the phrase "media particular playback system"

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[9] While Dr. Kyriakakis did not explain what he means by "media formats," I presume he is referring to media formats such as MP3, FLAC, MPEG-4, etc. *See, e.g.*, https://developer.android.com/guide/topics/media/media-formats.

refers to a "playback system that can only play . . . particular media types," as a way to differentiate from a playback system that can play other media types, then the bolded phrases containing "multimedia content" would be incorrect and should instead read "playing back the retrieved ~~multimedia~~ content <u>of the particular media types</u>" and "playing back the ~~multimedia~~ content <u>of the particular media types</u> in synchrony." Of course, this is not how the remainder of the claims is worded (and no other claims of the '615 Patent are worded in this manner).   In my opinion, it would be unreasonable for a POSITA that has read the entirety of any one of claims 3, 15, or 26 of the '615 Patent to interpret the phrase "media particular playback system" in a manner that is inconsistent with the remainder of the claim, as Dr. Kyriakakis' second alternative interpretation would require.

88.   Although it is unclear, it appears that Dr. Kyriakakis might be proposing a third alternative interpretation of the phrase "media particular playback system" in his assertion that "[a] POSITA could theoretically understand 'media particular' as intended to differentiate from 'multimedia,' i.e. a playback system specific to a particular type of media – such as audio." Kyriakakis Dec. at ¶ 56. As an initial matter, Dr. Kyriakakis appears to be interpreting the term "multimedia" to require ***multiple*** types of media (as opposed to a ***single*** type of media), which is inconsistent with how the '615 Patent uses the term "multimedia." In this regard, the '615 Patent repeatedly uses the term "multimedia" to refer to a ***single*** type of media, such as audio. *See, e.g.*, '615 Patent at 1:66-2:14 ("[N]etworks can be used to connect one or more ***multimedia*** playback devices for a home or other location playback network (e.g., a home ***music*** system). . . . ***Music*** and/or ***other multimedia*** content can be shared . . . ."), 3:28-37 ("A zone player 102-124, also

referred to as a . . . *multimedia* unit, . . . provides *audio, video,* and/*or* audiovisual output."), 6:8-7:19, 11:6-14, 12:8-63, 15:51-57, FIGs 2A-C.

89.   Regardless, to the extent that Dr. Kyriakakis intends this to be a third alternative interpretation different from his second alternative interpretation ("playback system that can only play . . . particular media types"), it is similarly unreasonable given the remaining language of claims 3, 15, and 26 of the '615 Patent.

90.   For instance, as I explained before, each of these claims further recites "wherein the particular playback device *playing back the retrieved multimedia content* comprises the particular playback device and the at least one additional playback device *playing back the multimedia content in synchrony*." If, as Dr. Kyriakakis contends, the phrase "media particular playback system" refers to a "playback system specific to a particular type of media," as a way to differentiate from a playback system that can play "multimedia" (which Dr. Kyriakakis appears to be interpreting to require multiple types of media), then the bolded phrases containing "multimedia content" would be incorrect and should instead read "playing back the retrieved ~~multimedia~~ content of the particular type of media" and "playing back the ~~multimedia~~ content of the particular type of media in synchrony." This (mis)interpretation is not how the remainder of the claims is worded (and no other claims of the '615 Patent are worded in this manner).   As before, in my opinion, it would be unreasonable for a POSITA that has read the entirety of any one of claims 3, 15, or 26 of the '615 Patent to interpret the phrase "media particular playback system" in a manner that is inconsistent with the remainder of the claim, as Dr. Kyriakakis' apparent third alternative interpretation would require.

91.   Dr. Kyriakakis also asserts that "[c]ertain playback systems also do not playback media," "[a]n example of a playback system that is not 'media particular' would be an RF

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spectrum analyzer that records and plays back RF data," and thus, "a POSITA could also understand 'media particular playback system' as a subset of 'playback systems.'" Kyriakakis Dec. at ¶ 57. In my opinion, this is not a reasonable interpretation of the phrase "media particular playback system" either.

92.   In the context of the '615 Patent, the term "playback system" exclusively refers to systems that are capable of playing back media. In fact, Dr. Kyriakakis has pointed to no teaching in the '615 Patent to the contrary, which is unsurprising because the '615 Patent never contemplates that a "playback system" could mean anything else. Given those facts, it is my opinion that, in the context of the '615 Patent, a POSITA would never consider the term "playback system" to be broad enough to encompass something that does not play media, like an "RF spectrum analyzer." Consequently, in my opinion, it would not be reasonable for a POSITA to interpret the modifier "media particular" before "playback system" to serve as a means for distinguishing a "playback system" that can play back media from one that cannot.

93.   The prosecution history confirms my opinion. In this respect, the claims already recited a "media playback system" before the amendment was made that introduced the inadvertent inclusion of the word "particular." *See* Schmidt Op. Dec., App'x N at p.3 (pending claim 3), p.7 (pending claim 12), p.11 (pending claim 20). As such, even before the word "particular" was added, the claims excluded systems that cannot play back media. Thus, a POSITA would readily appreciate that the amendment adding in the word "particular" was not made as an attempt to draw a distinction from systems that cannot play back media.

94.   Lastly, even if a POSITA were trying to distinguish between systems that can playback media and those that cannot, it is my opinion that a POSITA would not do so by referring to the former as a "***media particular** playback system*" because that phrase is

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nonsensical. Instead, in my opinion, a POSITA would refer to a system that can playback media

as a "media playback system" or a "multimedia playback system."

95.   Assuming for sake of argument that Dr. Kyriakakis' contention is correct that a

POSITA could reasonably "understand 'media particular playback system' as a subset of

'playback systems,'" that would leave two options -- either (i) the phrase "media particular

playback system" refers to a "playback system" that can play back media or (ii) the phrase

"media particular playback system" contains an error that should be fixed to instead recite

"media playback system." But either way, the result is the phrase being afforded the same

meaning: a playback system that can play back media. Thus, in my opinion, Dr. Kyriakakis

cannot credibly argue that the phrase is indefinite.

96.   Lastly, Dr. Kyriakakis summarily stated with no analysis whatsoever: "I have

reviewed the prosecution history, but find that it does not resolve the debate relating to the use of

the term 'particular.'" Kyriakakis Dec. at ¶ 58. However, Dr. Kyriakakis fails to acknowledge

that the prosecution history confirms that there is *no reasonable* debate.

97.   In fact, when the amendments introducing the typographical error to claims 3, 15,

and 26 of the '615 Patent were made, Sonos presented no argument to the USPTO distinguishing

art based on "a playback system that can only play particular media formats[or] particular media

types," distinguishing a "playback system specific to a particular type of media" from a playback

system that plays "multimedia," or distinguishing "playback systems [that] do not playback

media" versus those that do. *See* Schmidt Op. Dec., App'x N at p.14.

98.   In my opinion, this confirms that Sonos was not meaning to impart any of the

specialized meanings that Dr. Kyriakakis contends when the word "particular" was inserted

between "media" and "playback system." Instead, as I discussed in my Opening Declaration, a

POSITA would readily understand that Sonos merely inadvertently propagated the word

"particular" at an incorrect place in the claim language in its attempt to maintain proper

antecedent basis.

99.   Thus, the prosecution history further confirms to a POSITA that there is no

reasonable debate that the word "particular" was inadvertently included in the phrase "media

particular playback system."

X.   "WHEREIN THE INSTRUCTION COMPRISES AN INSTRUCTION"

100.   Dr. Kyriakakis contends that "[t]he specification of the '033 Patent is of no help

to determine the meaning of the phrase 'wherein the instruction comprises an instruction,' and it

is my opinion that a person of ordinary skill in the art would be similarly unable to determine the

meaning of the phrase." Kyriakakis Dec. at ¶ 75. I disagree.

101.   Each of independent claims 1 and 12 of the '033 Patent recites, *inter alia*, "based

on receiving the user input, ***transmitting an instruction*** for the at least one given playback

device to take over responsibility for playback of the remote playback queue from the computing

device . . . ." In turn, each of dependent claims 2 and 13 recites "wherein the instruction

comprises an instruction for" and continues setting forth additional limitations of the transmitted

"instruction."

102.   As I explained before, I have been informed that the transitional term

"comprising"/"comprises" is synonymous with "including," "containing," or "characterized by,"

and such a transitional term is open-ended in that it does not exclude additional, unrecited

elements or method steps.

103.   With that understanding in mind, I fail to see how Dr. Kyriakakis can credibly say

that a POSITA would be unable to determine the meaning of the phrase "wherein the instruction

comprises an instruction . . . ." in claims 2 and 13 of the '033 Patent, even with Dr. Kyriakakis'

assumption that "an instruction" means a single instruction. *See* Kyriakakis Dec. at ¶ 74. In my

opinion, a POSITA would readily understand that the phrase "wherein the instruction comprises

an instruction for the cloud-based computing system associated with the media service to provide

the data . . . ." simply specifies additional characteristics of the transmitted "instruction" recited

in the independent claims.

104.   Indeed, it would be no different from a situation in which an independent claim

recited "a hat" and a dependent claim recited "wherein the hat comprises a hat that is red." A

POSITA would have no trouble understanding that the dependent claim merely provides more

specificity as to characteristics (e.g., the color) of the "hat" recited in the independent claim.

105.   I also fail to see the relevance of Dr. Kyriakakis' discussion of "a block of code,"

"lines of codes," one source code "function or method," "one 'for' loop," and "method calls,"

which suggests to me that Dr. Kyriakakis does not have a firm grasp of the claims or teachings of

the '033 Patent. Kyriakakis Dec. at ¶ 75.

106.   In particular, Dr. Kyriakakis' discussion of "a block of code," "lines of codes,"

one source code "function or method," "one 'for' loop," and "method calls" suggests that he is

referring to a device's "program instructions" that are stored in the device's memory and

executable by the device's processor, but a POSITA would readily understand that the term

"instruction" recited in the larger phrase "transmitting an instruction for the at least one given

playback device to take over responsibility for playback of the remote playback queue from the

computing device" found in claims 1 and 12 (which is the "instruction" that the dependent

claims 2 and 13 each further limits) is referring to a communication transmitted by the claimed

"computing device" over a data network that instructs the recipient to take one or more actions,

which is distinctly different from an executable "program instruction" stored in memory.

107.   Accordingly, Dr. Kyriakakis' discussion of concepts that are specific to executable "program instructions," such as "a block of code," "lines of codes," one source code "function or method," "one 'for' loop," and "method calls," etc. is irrelevant to the question of whether "wherein the instruction comprises an instruction" is indefinite and serves as an example of Dr. Kyriakakis interpreting the claim limitations through the lens of an individual that does not have the proper level of ordinary skill in the art.

I declare under penalty of perjury that the foregoing is true and correct to the best of my knowledge and belief.

Dated: June 15, 2021

DOUGLAS C. SCHMIDT

Appendix O

CS519: Computer Networks

Lecture 1: Jan 24, 2004

Intro to Computer Networking

Lets start at the beginning…

CS419

- What is a network for?
  - To allow two or more endpoints to communicate
- What is a network?
  - Nodes connected by links

Lets start at the beginning…

CS419

o Is this a network?

Node ⬭————link————⬭ Node

Lets start at the beginning…

CS419

○ Is this a network?

Node ○————— link —————○ Node
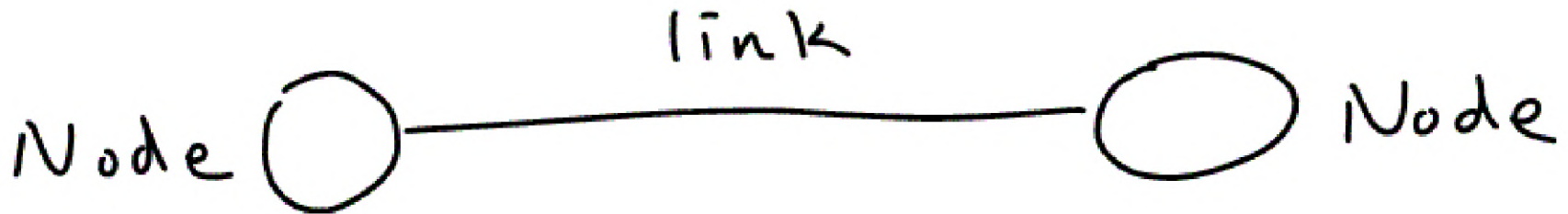
○ Of course it is!
  • Just not very interesting

Other "networks" (network topologies)

CS419
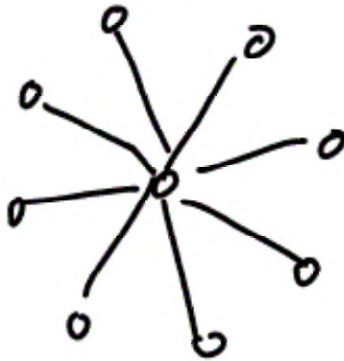
Star, or Hub and spoke
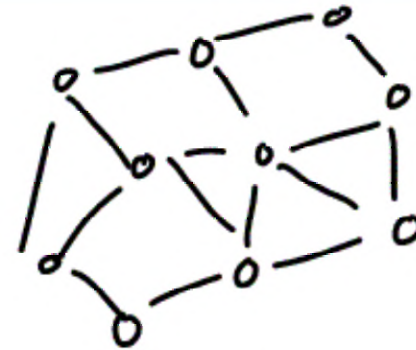
Mesh
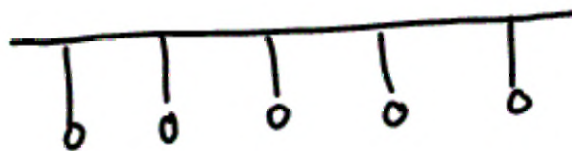
Broadcast
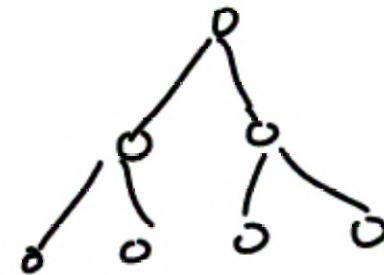
Hierarchical

What is a data network?

CS419

- The answer is NOT "a network that carries data"
  - Cause you can send "data" (e.g. a fax) over the "voice network"
- "Data network" is often a euphemism for "packet network"
  - And "voice network" is often a euphemism for "circuit network"

Packet network versus circuit network

CS419

- Historically, a circuit network was a network that literally established a physical wired connection between two points
  - With relays, plus amplifiers and stuff
- Before computers, this was the only way to do networks

Packet network versus circuit network

CS419

○ But these days voice is modulated and digitized in numerous ways as it works through the network

  ● Very few physical circuits

○ So nowadays we consider a circuit network one that appears to establish a fixed "pipe" (amount of bandwidth) between two points

Types of circuits

CS419

○ Synchronous time-division multiplexing (STDM)

- Each circuit is given a slice of time

○ Frequency-division multiplexing (FDM)

- Each circuit is given a transmission frequency

Packet network versus circuit network

CS419

○ By contrast, a packet network allows small units of data (packets) to be individually sent to different destinations

Packet network versus circuit network

CS419

A   B
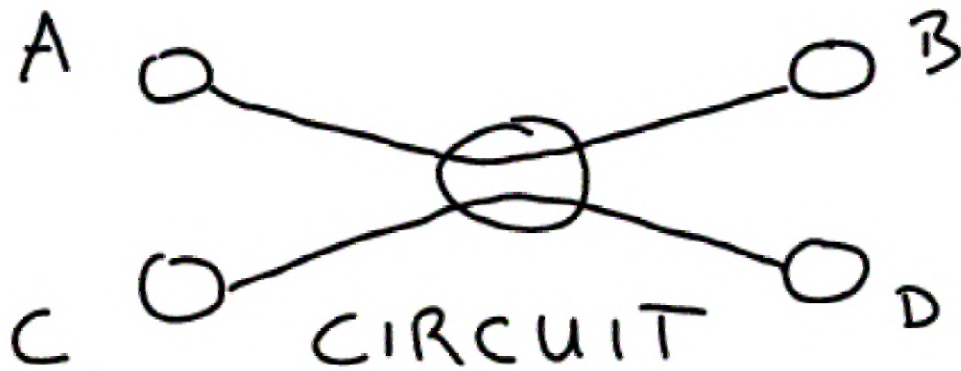
C   CIRCUIT   D

C can't talk to B
while A is
talking to B

A   B

X
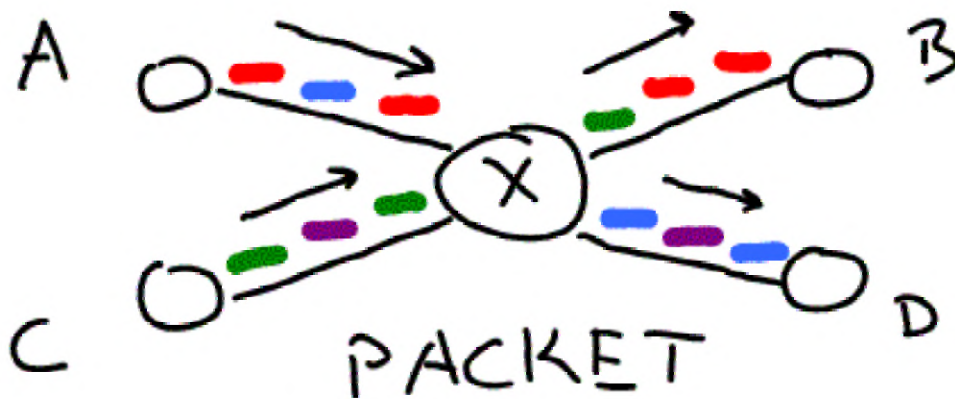
C   PACKET   D

A and C can
both talk to
B and D

Packet network versus circuit network

CS419

- So clearly packet switched is better than circuit switched, right?

Packet network versus circuit network

CS419

- So clearly packet switched is better than circuit switched, right?

- Well, as with so much in this world, *it depends*

- What if A and C try to talk exclusively to B at high speed at the same time?

Delay and packet loss in packet networks

CS419

A

B

X

C

D

Queue to B fills up, packets are delayed or lost
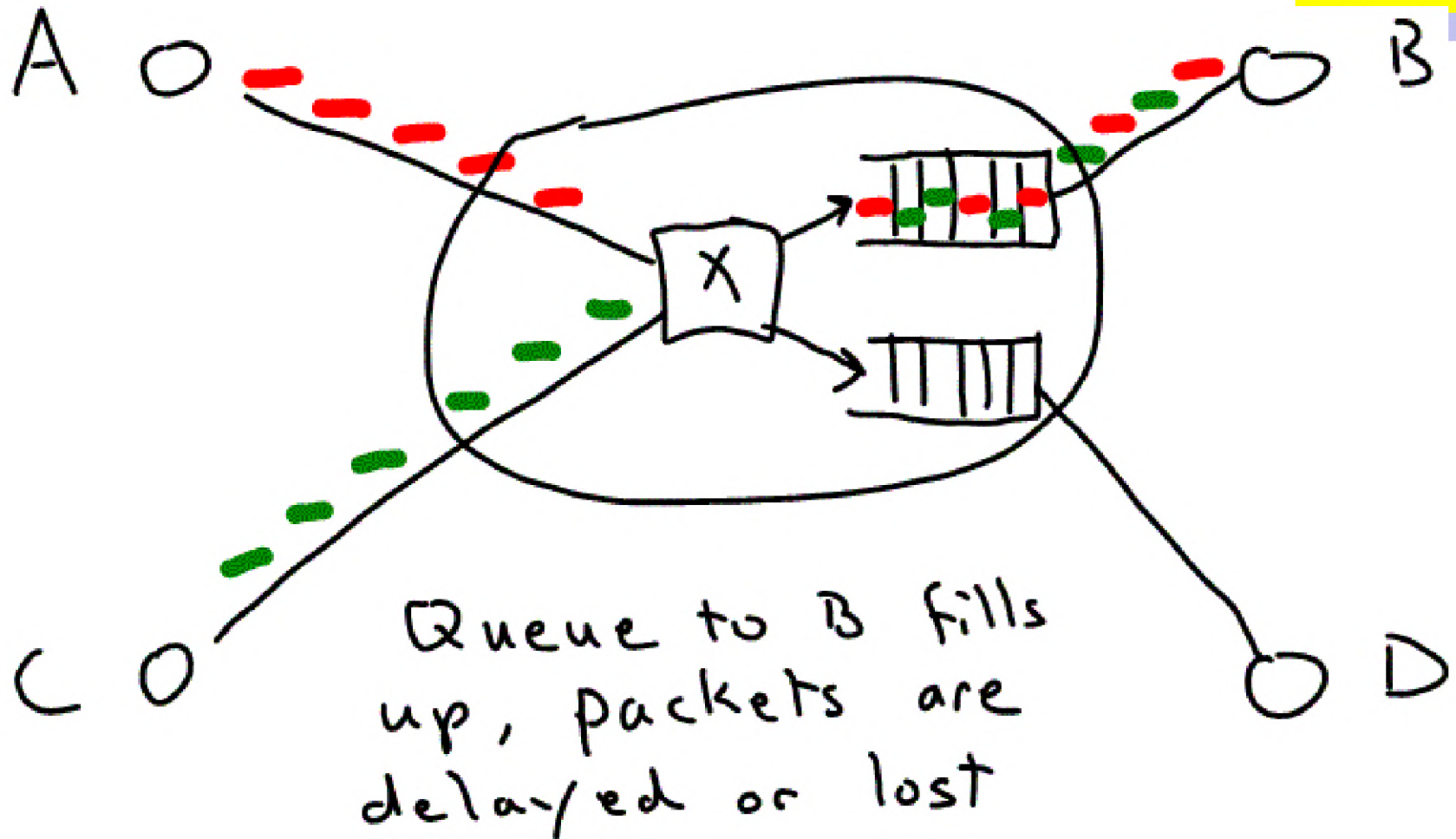
Delay and packet loss in packet networks

CS419

- Can happen any time multiple links feed into a single link
  - And incoming volume exceeds outgoing volume
- Larger queues can reduce packet loss at the expense of more delay
- Ultimately the sources have to slow down (congestion control)
- By contrast, circuit networks can block (busy tone)

Also Jitter

CS419
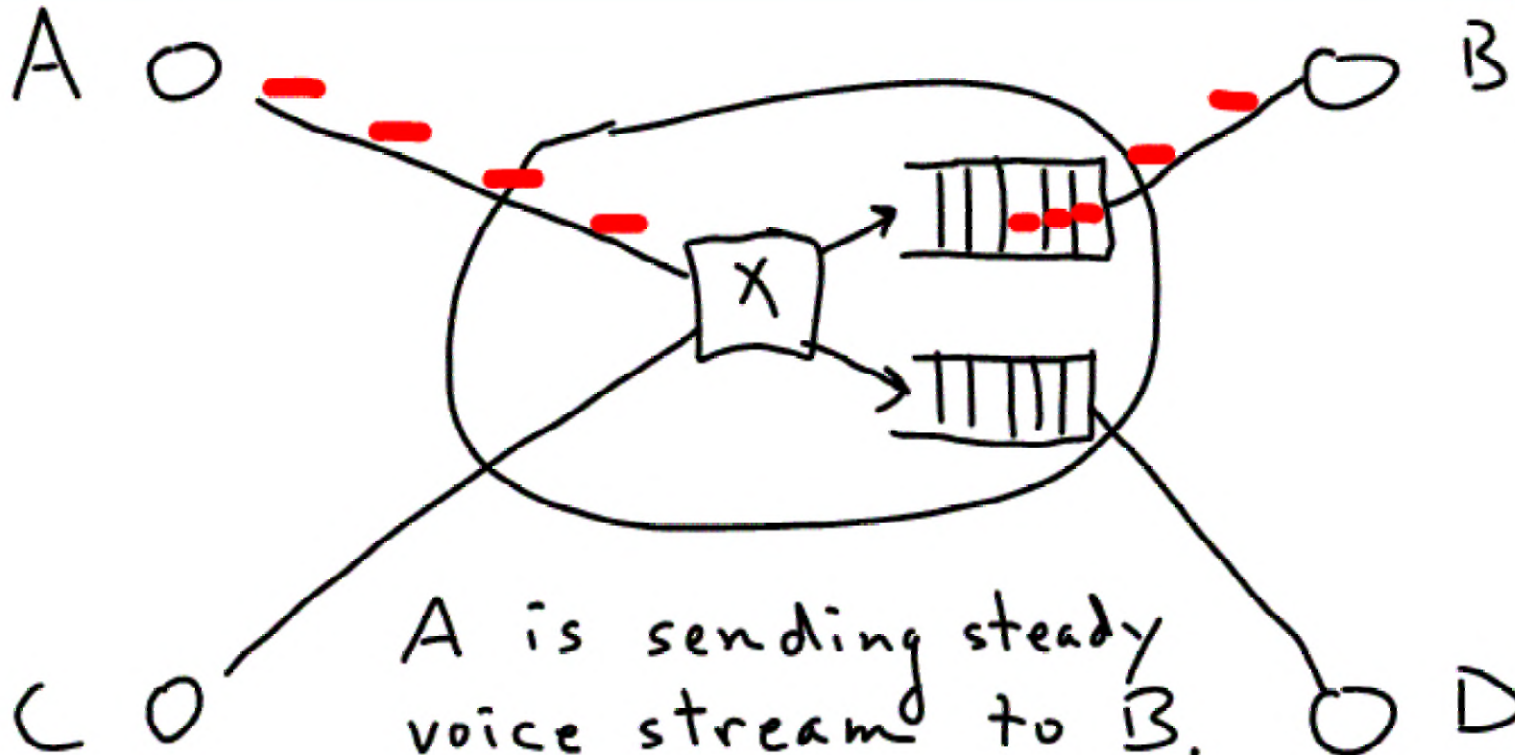
A is sending steady voice stream to B.
Delay is bad. Variation in delay is bad too. → Jitter

Also Jitter

CS419

A

B

X

C

D

C sends a burst
of packets.

Also Jitter

CS419

This burst interrupts A's steady stream, B hears garbage.
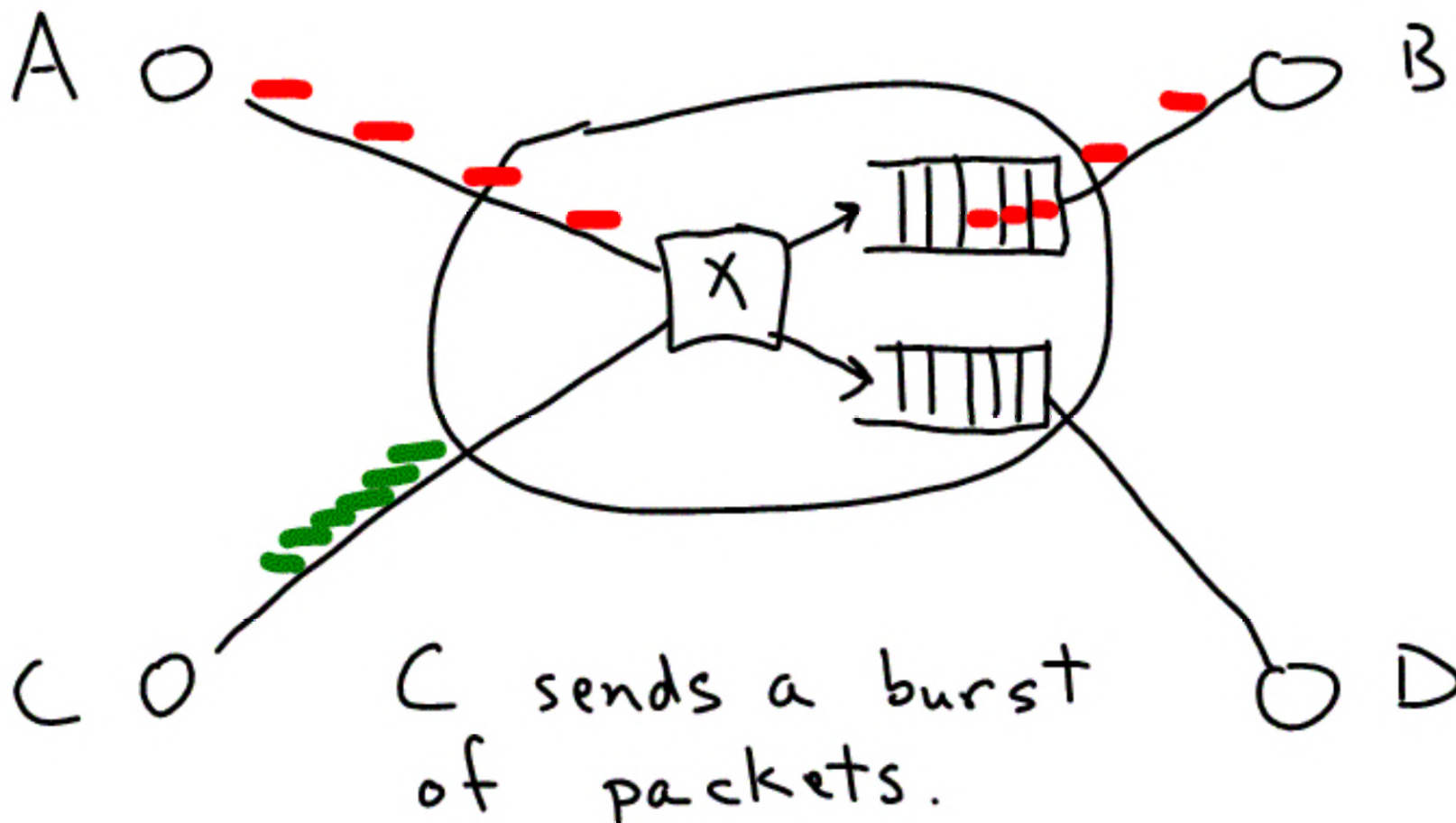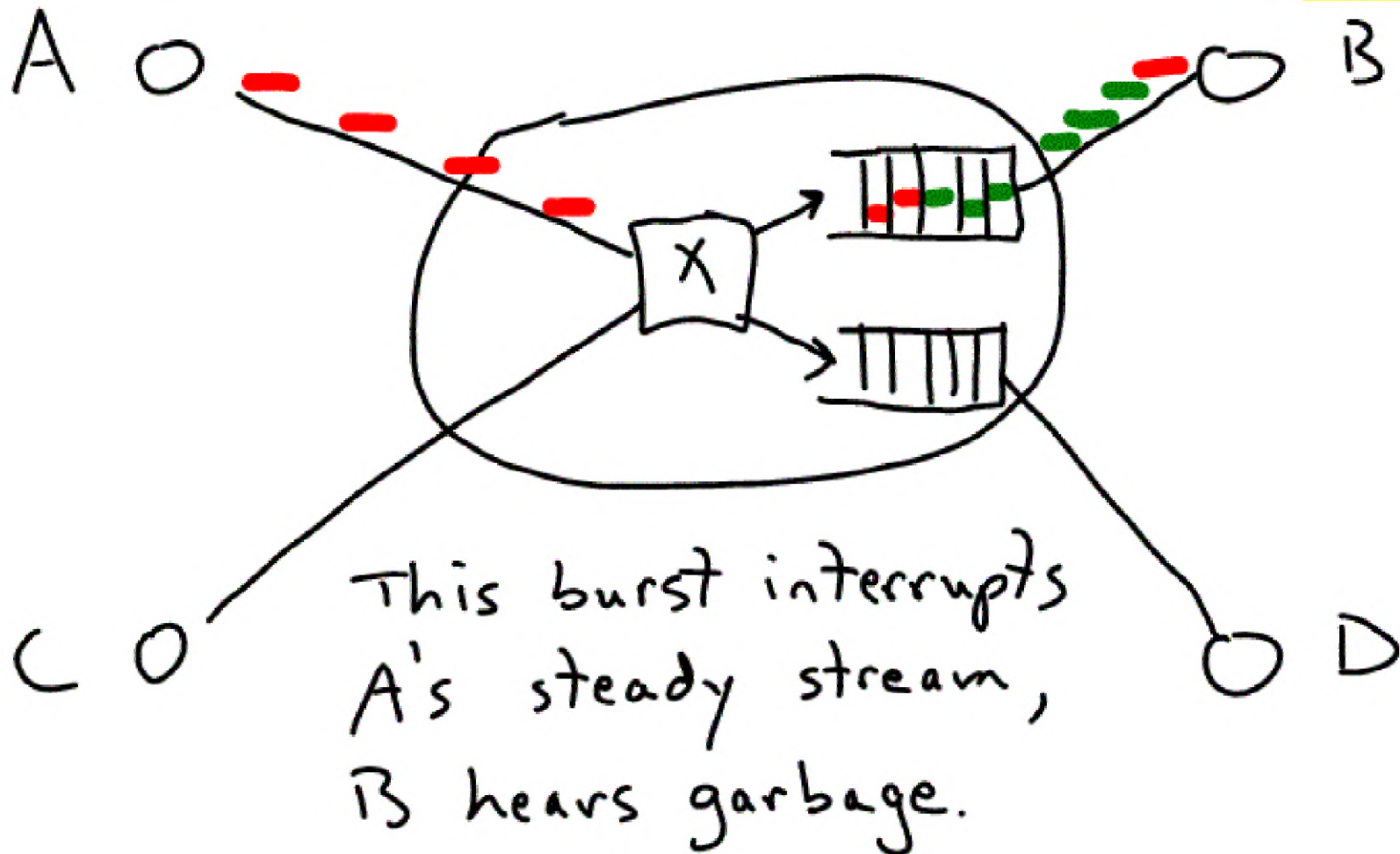
Circuits versus packets

CS419

○ Circuits are an all or nothing proposition

- Give good quality, if you can get yourself a circuit in the first place
- Efficient only if the application keeps the circuit full (I.e. a voice stream)

○ Packets are more flexible

- Can send a little or a lot
- But other traffic can interfere at any time
- More efficient when traffic is bursty

Can a packet network emulate a circuit?

CS419

○ After all, our STDM circuit sent data over the wire in "chunks"

Can a packet network emulate a circuit?

CS419

- After all, our STDM circuit sent data over the wire in "chunks"

- The answer is yes, it can

- And indeed, the first packet networks offered "services" that very much emulated circuits

One way to do it

CS419
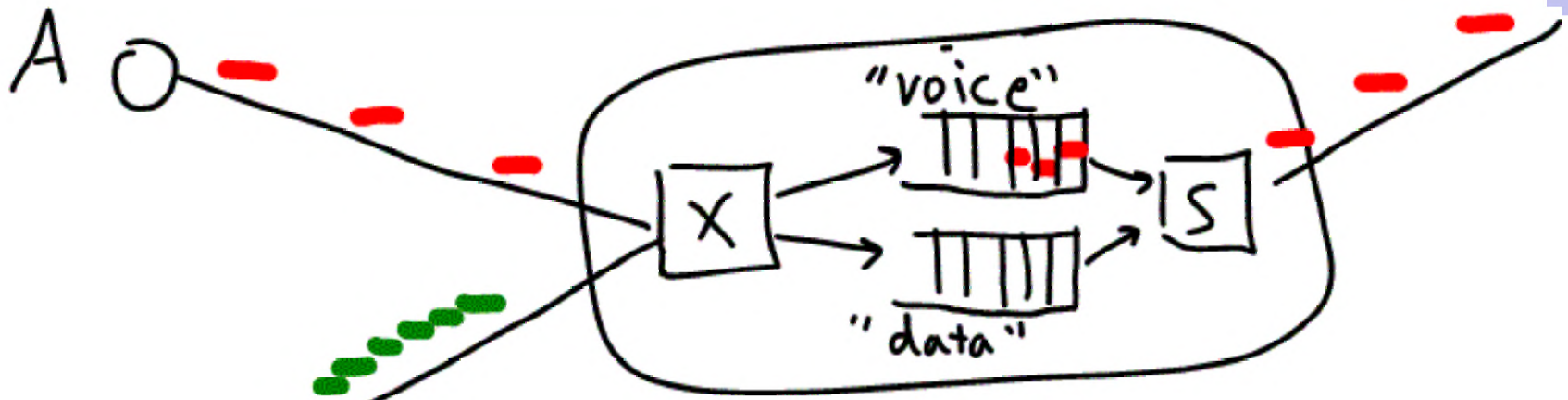
Treat "voice" and "data" packets differently, for instance with different queues and schedulers

One way to do it

CS419
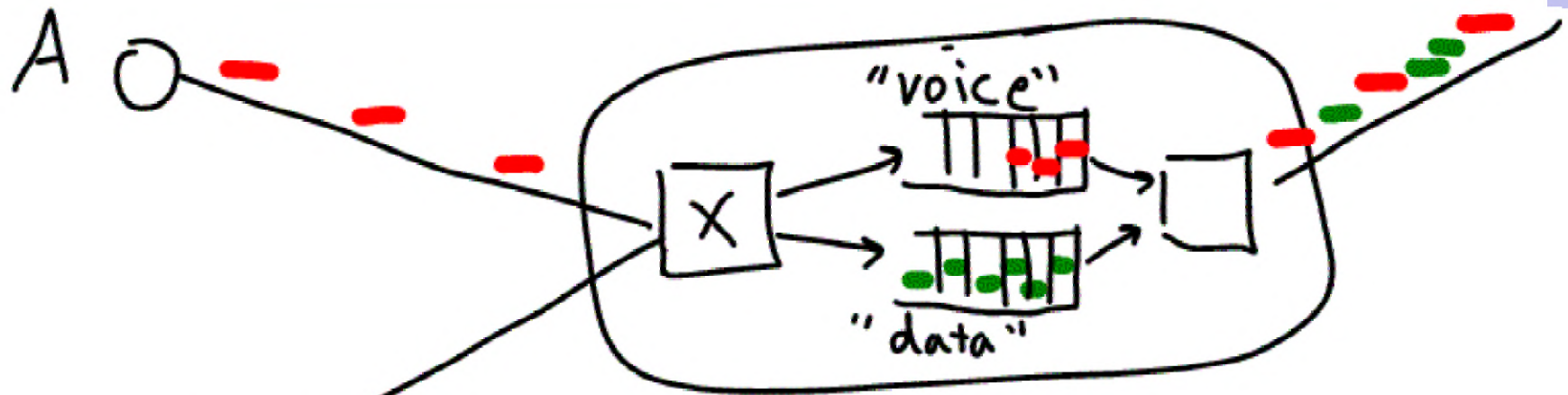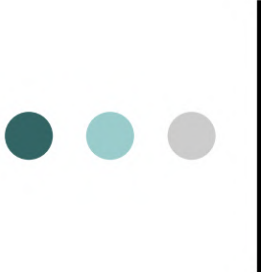
This way, a burst of data doesn't add jitter to the voice, but rather gets delayed itself

But this has complications too

CS419

"voice"

X

"data"

A
E
F
C
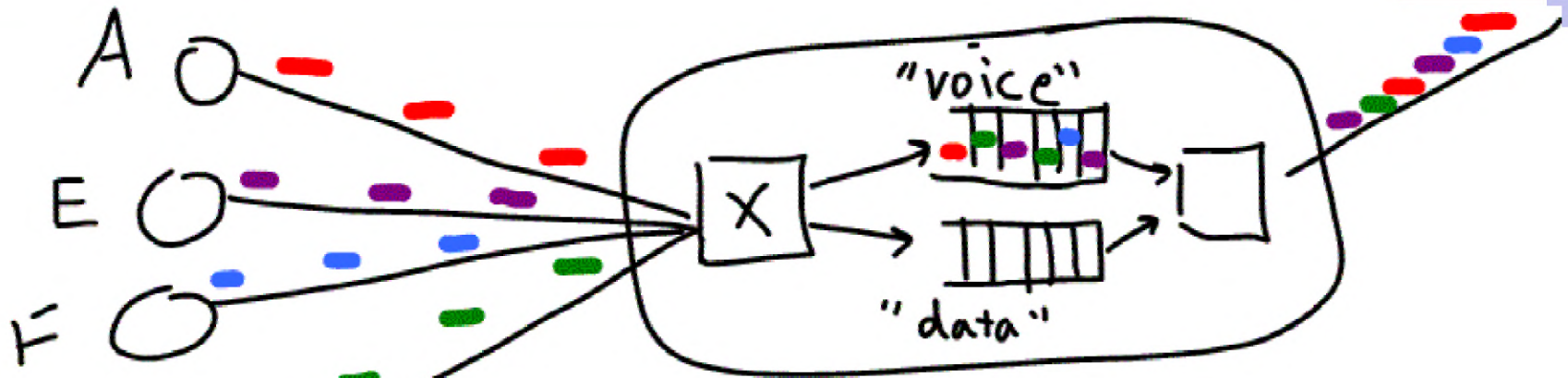
Too many voice "flows" can still overflow the queue. Must be a way to reserve queuing resources ("call setup")

"Datagram" versus "virtual circuit" networks

CS419

- Both are packet networks
  - (We won't discuss pure circuit networks any more in this course)
- Virtual circuit networks have the notion of call setup and blocking
  - But much more complex traffic models than our simple two-queue example
- Datagram networks is how the Internet ultimately got built!

But virtual circuit networks still important

CS419

- We don't see virtual circuit networks to our desktop
  - Though this was the vision for many folks
- But virtual circuit networks formed the unpinning of the Internet
  - Something called ATM
  - Being replaced with MPLS

This class focuses on the Internet

CS419

- Which is a datagram network
- One big topic will be how queues in the Internet manage not to become hopelessly overloaded
  - Many of you know, the answer is TCP, but we'll look at this in detail

Some terms introduced so far

CS419

- Network, node, link, queue
- Circuit and packet networks
  - a.k.a. data and voice networks
- Virtual circuit and datagram networks
- Delay, latency, loss, drop, jitter, blocking

Bandwidth and Latency

CS419

○ We looked at delay due to queuing

○ But there are three main components to delay:

- Propagation delay

- Transmit delay

- Queuing delay

Queuing, transmit, and propagation delays

CS419

Queuing, transmit, and propagation delays

CS419

Queuing Delay
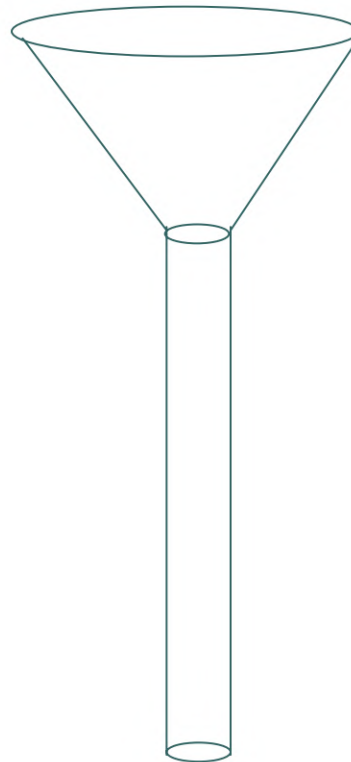
Propagation Delay
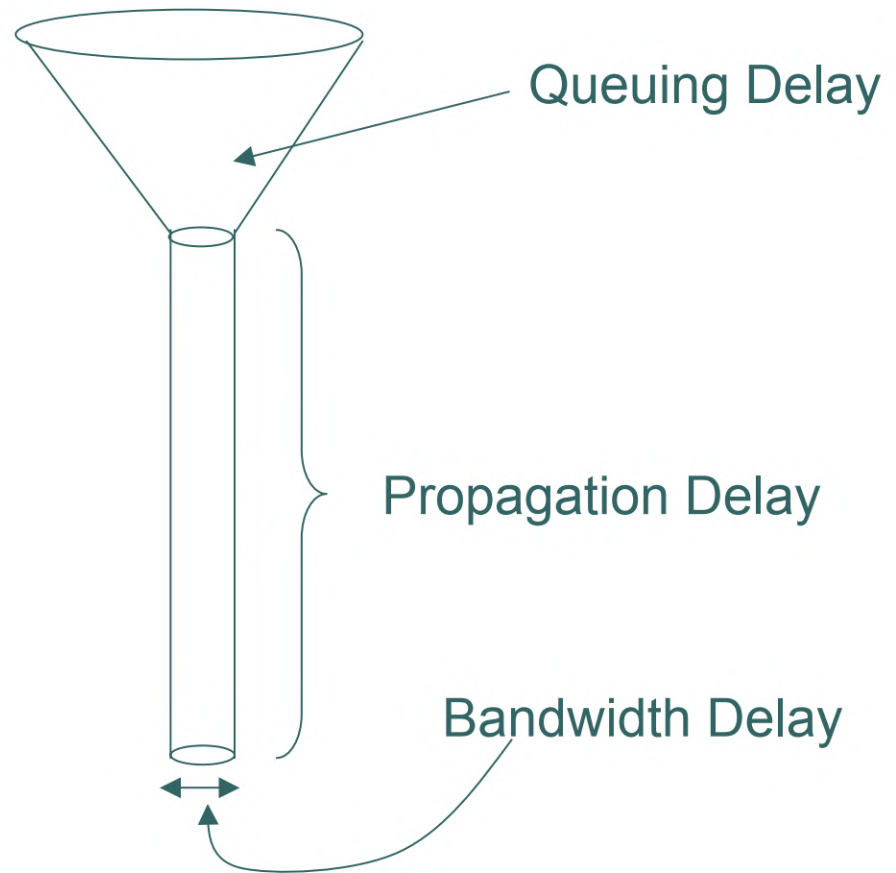
Bandwidth Delay

Total latency

CS419

○ Total latency =
  - Propagation + Transmit + Queue
○ Propagation =
  - Distance / Speed of light
○ Transmit =
  - Packet size / Bandwidth

Delay x Bandwidth Product

CS419

- Refers to the number of bits you can have "in the pipe" at the same time
  - Or, how many bits you can stuff in the pipe before the first bit comes out the other end
  - Like hot water getting from the water heater to your shower!
- As bandwidth increases (and distance doesn't change) this is becoming an issue

An extreme (but realistic) Delay x Bandwidth Example

CS419

- Coast-to-coast propagation delay = 15ms

- OC192 link = 10 Gbps

- 10 Gbps x 15ms = 150,000,000 bits = 19 Mbytes = 7 songs (MP3 files)

- You could stuff 7 songs into an OC192 pipe at Boston before the first song starting arriving in LA!!!

A more common Delay x Bandwidth Example

CS419

- 50ms coast to coast delay (mainly from queuing)

- 100 Mbps Ethernet

- This is about 600Kbytes…still a decent sized file

- Delay x Bandwidth is starting to dominate our thinking about protocol performance

Common provider bandwidth units

CS419

- DSO = 64 Kbps
- DS1 = 1.544 Mbps
- DS3 = 44.736 Mbps
- OC3 = 155.52 Mbps
- OC12 = 622.08 Mbps
- OC48 = 2.488 Gbps
- OC192 = 9.953 Gbps
- OC768 = 39.813 Gbps

Bandwidth and throughput and goodput

CS419

- Bandwidth is the maximum theoretical speed of a pipe
- Throughput is the actual measured speed
  - Vague term because depends on where you measure
- Goodput is the throughput seen by the application
  - Throughput over the pipe can be more than goodput because of dropped and retransmitted packets, control packets, and headers

Appendix P

```
 1              IN THE UNITED STATES DISTRICT COURT
 2            FOR THE WESTERN DISTRICT OF TEXAS
 3                     WACO DIVISION
 4    _____
                                      )
 5    SONOS, INC.,                    )
                                      )
 6            Plaintiff,              )Civil Action No.
                                      )6:20-cv-00881-ADA
 7        vs.                         )
                                      )
 8    GOOGLE, LLC,                    )
                                      )
 9            Defendant.              )
      _____)
10
11
       VIDEOCONFERENCE DEPOSITION OF CHRISTOS KYRIAKAKIS
12
                  Friday, June 11, 2021
13
                        Volume I
14
15
16
17
18
19
20
21
22    Reported by:
      KATHLEEN E. BARNEY
23    CSR No. 5698
24    Job No. 4626386
25    PAGES 1 - 202
```

Page 1

1   IN THE UNITED STATES DISTRICT COURT
2   FOR THE WESTERN DISTRICT OF TEXAS
3   WACO DIVISION
4

_____
5   )
SONOS, INC.,   )
6   )
        Plaintiff,   )
7   )Civil Action No.
    vs.   )6:20-cv-00881-ADA
8   )
GOOGLE, LLC,   )
9   )
        Defendant.   )
10 _____)
11
12   Videoconference deposition of CHRISTOS
13 KYRIAKAKIS, Volume I, taken on behalf of Plaintiff,
14 beginning at 9:02 a.m. and ending at 3:10 p.m. on
15 Friday, June 11, 2021, before KATHLEEN E. BARNEY,
16 Certified Shorthand Reporter No. 5698.
17
18
19
20
21
22
23
24
25
                                                        Page 2

1 APPEARANCES:
2
3 For Plaintiff:
4
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8   Attorneys at Law
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10   Chicago, Illinois 60661
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14
15   QUINN EMANUEL URQUHART & SULLIVAN, LLP
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17   Attorney at Law
18   865 Figueroa Street
19   Los Angeles, California 90071
20   marckaplan@quinnemanuel.com
21
22
23 Videographer:
24   KIMBERLEE DECKER
25
                                                        Page 3

2 (Pages 2 - 5)

1 Exhibit 13   Dua Patent Application   159
2   Publication
3
4 Exhibit 14   '033 patent   196
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Page 6

1 from Lee Sullivan Shea & Smith.
2   MR. KAPLAN: This is Marc Kaplan from Quinn
3 Emanuel Urquhart & Sullivan for Google and the
4 witness.
5   MR. LEE: Good morning. This is George Lee   09:03:52
6 for plaintiff Sonos. I'm also with the firm of Lee
7 Sullivan Shea & Smith in Chicago.
8   THE VIDEOGRAPHER: Thank you. Will the court
9 reporter please swear in the witness.
10
11   CHRISTOS KYRIAKAKIS,
12 having been administered an oath, was examined and
13 testified as follows:
14
15   EXAMINATION
16 BY MR. PAK:
17   Q Dr. Kyriakakis, could you please state and
18 spell your name for the record.
19   A Sure. First name is -- legal first name is
20 Christos, but I go by Chris, last name is   09:04:34
21 K-Y-R-I-A-K-A-K-I-S.
22   Q Is it okay if I call you Dr. K throughout
23 this deposition?
24   A Yes, please do.
25   Q Have you been deposed before?   09:04:48

Page 8

1   Friday, June 11, 2021
2   9:02 a.m.
3
4   THE VIDEOGRAPHER: Good morning. We are on
5 the record at 9:02 a.m. on June 11, 2021.   09:02:30
6   All participants are appearing remotely.
7 Audio and video recording will continue to take
8 place unless all parties agree to go off the record.
9   This is Media Unit 1 of the recorded
10 deposition of Christos Kyriakakis taken by counsel   09:02:49
11 for the plaintiff in the matter of Sonos, Inc.,
12 versus Google, LLC, filed in the U.S. District
13 Court, Western District of Texas, Waco Division,
14 case number 6:20-CV-00881-ADA.
15   My name is Kimberlee Decker from Veritext   09:03:12
16 Legal Solutions. I'm the videographer. The court
17 reporter is Kathy Barney. I'm not related to any
18 party in this action, nor am I financially
19 interested in the outcome.
20   Counsel and all present will now state their   09:03:26
21 appearances and affiliations for the record. If
22 there are any objections to proceeding, please state
23 them at the time of your appearance, beginning with
24 the noticing attorney.
25   MR. PAK: This is Jae Pak, counsel for Sonos,   09:03:33

Page 7

1   A I have.
2   Q How many times have you been deposed? Just a
3 ballpark is fine.
4   A Two other times.
5   Q How many times have you been deposed as an   09:04:57
6 expert witness? Were you an expert witness in both
7 of those cases?
8   A Yes, I was.
9   Q And these are patent cases, correct?
10   A Correct.   09:05:16
11   Q When was the last time you were deposed?
12   A It was -- I think it was 2018. I don't have
13 the exact date, but I think it was 2018.
14   Q Sure. Do you remember what case that was?
15   A It was -- so it was two in that same year.   09:05:34
16 So one of them was -- I was working on behalf of
17 Apple, which was an ITC case. Actually, initially
18 the case involved Apple and Samsung as
19 co-defendants. So that was one case. And the other
20 case was for Apple, a separate case.   09:06:05
21   Q Okay. And so we're on the same page, I want
22 to run through some general guidelines. So just
23 bear with me here.
24   I'll ask you questions and you must give
25 truthful answers. Your counsel may object to   09:06:20

Page 9

3 (Pages 6 - 9)

1 questions, but unless your counsel instructs you not
2 to answer, you still must answer despite the
3 objection.
4   Do you understand?
5 A I do.   09:06:30
6 Q And if you don't understand a question or
7 need clarification, please ask. Otherwise I'll
8 assume that you understand the question.
9   We'll plan to take a break every hour or so.
10 If you need a break outside of that schedule, just   09:06:38
11 let me know and I'll accommodate the request. The
12 only thing I ask is, you know, to finish any pending
13 question before we go on break.
14   And the court reporter will be transcribing
15 our discussion today, so I need you to give verbal   09:06:50
16 answers as opposed to head nods or the like.
17   Understood?
18 A Yes.
19 Q Okay. I'll slow down here now.
20   When did you begin working on this case   09:07:02
21 between Sonos and Google?
22 A Oh, I don't know the exact date. It was a
23 few months ago.
24 Q Okay. So it was sometime this year?
25 A Yes.   09:07:16

Page 10

1 Q Did you sign an engagement letter?
2 A I did.
3 Q And when did you sign the engagement letter,
4 do you remember?
5 A Shortly after I talked to the attorneys and I   09:07:29
6 was told they wanted to retain me. I don't have the
7 exact date. I think it was a few months ago.
8 Q Few months as in maybe April of this year or
9 sometime before?
10 A I'm pretty sure it was before.   09:07:45
11 Q Okay.
12 A I don't have the exact date.
13 Q No, I understand.
14   Who is that engagement between? Is that
15 between you and Google or Google's counsel or   09:07:57
16 someone else?
17 A It is -- I believe it's between me and
18 Google's counsel.
19 Q And Google's counsel being Quinn Emanuel; is
20 that correct?
21 A Correct.
22 Q Have you worked with Quinn Emanuel before?
23 A I have.
24 Q How many times have you worked with Quinn
25 Emanuel?   09:08:18

Page 11

1 A Probably two other times. It was different
2 attorneys. Different matters.
3 Q What was the nature of your engagement with
4 Quinn Emanuel?
5   MR. KAPLAN: Object to form.   09:08:33
6   THE WITNESS: It was similar. They were
7 patent cases and I was an expert witness for their
8 client.
9 BY MR. PAK:
10 Q Do you recall what cases?   09:08:43
11 A I believe one was Blitzsafe versus Daimler
12 Benz, Mercedes. And the other one escapes me
13 because I remember the cases, but not necessarily
14 all the affiliations.
15   THE VIDEOGRAPHER: You're speaking a little   09:09:26
16 low.
17   THE WITNESS: Interesting. Okay. Is that
18 better?
19 BY MR. PAK:
20 Q Have you provided expert opinions on behalf   09:09:44
21 of Google before?
22 A I have not.
23 Q Have you offered opinions with respect to any
24 Google products?
25 A No.   09:09:55

Page 12

1 Q Have you offered opinions with respect to any
2 mobile apps that can be installed on your phone or
3 tablet?
4 A No.
5 Q Have you used any Google audio products   09:10:07
6 before?
7 A I have -- yes, I have used them. I don't own
8 them, but I have used them.
9 Q What products have you used?
10 A It was a Google speaker.   09:10:22
11 Q Do you know what speaker it was?
12 A I think it's called Google Home.
13 Q Did you use any specific feature of Google
14 Home?
15 A I was interested in evaluating the voice   09:10:45
16 performance, the voice recognition performance,
17 especially how it performs in noisy environments.
18 Q So you've experimented with Google Assistant;
19 is that correct?
20   MR. KAPLAN: Object to form.   09:11:12
21   THE WITNESS: In the context of that product,
22 yes.
23 BY MR. PAK:
24 Q Okay. Have you used the Google Home app
25 before?   09:11:24

Page 13

4 (Pages 10 - 13)

1   A No.
2   Q So how did you set up the Google Home
3 product?
4   A That's a good question. It's been a while.
5   Okay. I guess I used it to set it up. I   09:11:40
6 thought you were asking if I used it to interact
7 with it.
8   Q Okay. Have you used any Google Pixel device
9 before?
10   A No.   09:11:53
11   Q Have you used any Sonos products?
12   A Yes.
13   Q What Sonos products have you used before?
14   A Sonos Play:1. And Sonos Subwoofer.
15   Q Have you used any other Sonos products   09:12:17
16 before?
17   A No.
18   Q Do you own a Sonos Play:1 or Sonos Sub?
19   A Yes, I do.
20   Q When did you first purchase the Play:1 and   09:12:33
21 the Sonos Sub?
22   A Two years ago approximately.
23   Q Why did you purchase the Play:1 and Sonos
24 Sub?
25   A As part of my work and research, I have, I   09:12:59

Page 14

1 would say, an unusually large collection of speaker
2 products and I've purchased them to evaluate their
3 acoustic performance, compare them to others, and so
4 on.
5   Q Do you own more than one Play:1 and more than 09:13:16
6 one Sonos Sub?
7   A I have three Play:1s and one Sonos Sub.
8   Q Have you ever stereo-paired two Play:1s
9 together?
10   A Yes. Yes, I have.   09:13:47
11   Q And have you compared that to other -- when
12 you say others, you're talking about other audio
13 products?
14   A I guess what do you mean by "compared"?
15   Q Yeah. So you said you evaluated the acoustic 09:14:09
16 performance of the Sonos Play:1 products with
17 others, right?
18   A Yes.
19   Q And who are these others that you're
20 referring to here?   09:14:23
21   MR. KAPLAN: Object to form.
22   THE WITNESS: There's a number of them. Some
23 are home speakers. PSB. Bose. Amazon products.
24 Paradigm is a high-end company that makes wireless
25 speakers. A number of others.   09:14:51

Page 15

1   I mean, that's kind of what I do on a regular
2 basis just to understand what is going on and who is
3 doing what acoustically in rooms.
4 BY MR. PAK:
5   Q So have you evaluated these products for   09:15:04
6 other reasons? Other than acoustic performance,
7 have you evaluated these products for some other
8 reason?
9   A No.
10   Q And just for curiosity, I guess, which   09:15:15
11 product has the best acoustic performance, in your
12 opinion?
13   A I'm going to get in big trouble. I'm not
14 going to answer that. A lot of them it's an
15 objective measurement, but a lot of it is very   09:15:35
16 subjective. So I'm probably going to stay away from
17 that one.
18   Q That's fair.
19   I want to talk about your professional
20 experience. Do you have any computer programming   09:15:46
21 experience?
22   A Yes.
23   Q Do you remember the last time you coded or
24 programmed something?
25   A Two days ago.   09:15:59

Page 16

1   Q Got it.
2   Have you taught any computer science courses
3 before?
4   A No.
5   Q Have you taught any network courses before?   09:16:09
6   A Network specific, no.
7   I should mention I have computer science
8 students in my courses, but they're not specific
9 under the computer science department.
10   Q Got it. But you haven't taught any computer   09:16:24
11 science courses. Did you say you haven't taught any
12 network courses; is that correct?
13   A That's correct.
14   Q Do you have any networking experience?
15   A Yes. Quite a bit, especially with streaming   09:16:41
16 media. My research group was one of the first to
17 implement multichannel audio streaming across the
18 country over Internet2, and for that we had a large
19 group that was working on various aspects of
20 networking, including peer to peer and other aspects 09:17:05
21 of it. So, yeah, quite a bit of experience.
22   Q What is Internet2?
23   A Internet2 is what the internet was when it
24 first started, which is a network that was closed
25 off to the public and only open to academic and   09:17:24

Page 17

5 (Pages 14 - 17)

1 research institutions. It's a much higher bandwidth
2 network that is basically used for experimentation
3 for next-generation applications on the internet.
4   Q So do you have any experience in designing or
5 implementing a network?   09:17:48
6   A My experience is in coding, testing
7 performance of networks, not necessarily designing
8 networks from scratch. Software that goes on
9 networks, though, yes.
10   Q But you never designed or architected a   09:18:11
11 network, right? Is that right?
12   MR. KAPLAN: Object to form.
13   THE WITNESS: Well, I guess I'm --
14 architected -- I was part of the team. I led the
15 team that architected a multichannel audio streaming   09:18:34
16 solution, Lossless, over a network. And so I didn't
17 build the network from scratch. It was an existing
18 network. We just built the software to run all of
19 that.
20 BY MR. PAK: 09:19:01
21   Q Got it.
22   And you're the founder and CTO of a company
23 called Audyssey Laboratories; is that correct?
24   A That's right.
25   Q And I see the background. Is that an   09:19:07

Page 18

1 Audyssey Laboratories product behind you?
2   A The loud speaker, no.
3   Q No?
4   A No, it's not. I have one, but it's not in
5 this room.   09:19:21
6   Q What products did you help design at
7 Audyssey?
8   A So Audyssey was a spinout from my research
9 lab at USC with a couple of graduate students. We
10 started in the audio technology licensing business,   09:19:36
11 and so the product there was technologies for
12 automatic measuring of acoustical problems in rooms
13 and solutions for fixing them. And perhaps you've
14 seen the little microphone that comes with home
15 theater equipment. You put it in your living room   09:20:01
16 or your car or IMAX theaters, for example. There
17 are many places that have that.
18   So it started as a software solution that was
19 being licensed. In the course of that company, we
20 also designed some loudspeaker products to showcase   09:20:23
21 the technologies so that we could be fully in
22 control of them.
23   And these were wireless speakers. Three were
24 wireless and one was wired. And so those were --
25 those were the physical products that found   09:20:48

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1 themselves inside the stores like the Apple Store
2 and Best Buy.
3   Q Do you know any Audyssey -- do you know the
4 product names of any of the Audyssey products?
5   A The loudspeakers?   09:21:02
6   Q Yes. Any Audyssey product, really.
7   A So the main Audyssey product was called
8 MultEQ, M-U-L-T-E-Q. That was the name of the
9 umbrella of technologies that had to do with
10 acquiring in-room information, acoustical   09:21:21
11 information, and correcting it. And the logo is
12 still found on many receivers like Marantz and
13 Denon, D-E-N-O-N.
14   The speaker products had -- were named of
15 after interesting, hip neighborhoods. That was the   09:21:51
16 marketing plan. So Lower East Side, Market -- South
17 of Market. Yeah.
18   Q Are you familiar with the Audyssey Sub
19 Equalizer product?
20   A I am, yes.   09:22:19
21   Q What is a sub equalizer?
22   A A sub equalizer -- so in the home theater
23 market, it is popular to have separate components
24 for audio systems. So people will buy their
25 favorite loudspeakers, they will buy their favorite   09:22:39

Page 20

1 audio receiver amplifier.
2   And for people that already had invested
3 money in a product that didn't have Audyssey room
4 correction in it, we actually made two products.
5 One was called the Audyssey Equalizer, which allowed   09:22:51
6 you to insert it in the path, in the audio path, and
7 take advantage of the Audyssey technologies.
8   And the sub equalizer was basically the same
9 thing except it was only focused on room correction
10 of the subwoofer frequency range, the low   09:23:15
11 frequencies.
12   Q Got it.
13   And I want to introduce an exhibit here.
14 It's the Audyssey manual. And I just uploaded it in
15 the exhibits folder and marked it as Exhibit 1.   09:23:28
16   (Exhibit 1 was marked for identification
17   electronically and is attached hereto.)
18 BY MR. PAK:
19   Q Do you see that?
20   A Not yet. I'm refreshing the screen here.   09:23:34
21 I'm looking at another monitor, so --
22   Q Sure. I am too.
23   THE VIDEOGRAPHER: You have to refresh the
24 browser each time.
25   MR. KAPLAN: Chris, sometimes you can just   09:24:02

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6 (Pages 18 - 21)

1 hit the Marked Exhibits folder again and that will
2 do it.
3   THE WITNESS: Oh, there it is. Okay. I got
4 it. I'm opening it now.
5 BY MR. PAK: 09:24:17
6   Q   Do you recognize this document?
7   A   Sorry, it hasn't opened yet.
8   Q   Sure. Let me know.
9   A   Okay. Yes, it's open now.
10   Yes, I recognize it.   09:24:26
11   Q   Okay. And this is the Audyssey MultEQ Pro
12 User Guide, correct?
13   A   Correct, MultEQ Pro. It was software that we
14 provided to home theater installers. And this was
15 additional functionality than what a consumer could   09:24:45
16 do with the built-in software. And we marketed it
17 as MultEQ Pro.
18   Q   I want to turn to PDF, page 14. And there's
19 a connection diagram for the Audyssey Sub Equalizer.
20   Do you see that?   09:25:02
21   A   It's coming. Page 14?
22   Q   PDF page 14.
23   A   Oh, PDF page 14.
24   Q   But it's page 10 of the manual.
25   A   Okay.   09:25:26

Page 22

1   Q   Okay. So you see the connection diagram for
2 the Audyssey --
3   A   Yes.
4   Q   Does that look like an accurate
5 representation of the Sub Equalizer?   09:25:33
6   MR. KAPLAN: Object to form.
7   THE WITNESS: It's an accurate representation
8 of how we recommended the connection, yes.
9 BY MR. PAK:
10   Q   Was the Sub Equalizer designed to communicate   09:25:48
11 over Wi-Fi?
12   A   No.
13   Q   Was the Sub Equalizer designed to communicate
14 over Bluetooth?
15   A   No.   09:25:58
16   Q   Was the Sub Equalizer designed to communicate
17 over Ethernet?
18   A   No.
19   Q   Was the Sub Equalizer designed to communicate
20 over a data network?   09:26:09
21   A   Well, it was designed to accept, process and
22 produce or transmit audio data.
23   So in the context of data -- audio being
24 data, which it is, I would say yes, it's connected
25 to two devices as shown here and it's passing audio   09:26:30

Page 23

1 data after processing it.
2   Q   Well, let me ask you this. The Sub Equalizer
3 was not designed to communicate over Wi-Fi,
4 Bluetooth, or Ethernet. How did it communicate over
5 a data network?   09:27:01
6   MR. KAPLAN: Object to form.
7   THE WITNESS: Well, those are not the only
8 types of networks. Anything that carries data is a
9 data network. So this is an audio data network.
10 BY MR. PAK: 09:27:11
11   Q   You're saying these speakers -- how are these
12 speakers connected to the Sub Equalizer?
13   A   Through audio cables.
14   Q   What kind of -- sorry, I didn't mean to cut
15 you off.   09:27:27
16   A   No, no. It's fine.
17   Q   What audio cables do you use to connect, you
18 know, one of these speakers to a Sub Equalizer?
19   A   They're called line level cables or RCA
20 because of the type of connector, which is named as   09:27:46
21 an RCA connector.
22   Q   So if you have a speaker connected to, you
23 know, another device, you know, another device here
24 being a Sub Equalizer via RCA cables, are they
25 communicating over a data network?   09:28:06

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1   A   In the most general definition of a data
2 network, audio certainly falls into that. And I
3 would consider this a wired data network. To put it
4 in the context of the discussion we're having today,
5 yes.   09:28:27
6   Q   Okay. So, I mean, any device that can carry
7 data to another device is a data network; is that
8 correct?
9   MR. KAPLAN: Object to form.
10   THE WITNESS: Any infrastructure that can   09:28:37
11 connect devices and carry data, yes.
12 BY MR. PAK:
13   Q   In general, do you have an understanding of
14 what a term of art is?
15   A   Yes.   09:28:53
16   MR. KAPLAN: Object to form.
17 BY MR. PAK:
18   Q   What is your understanding?
19   A   A term of art in my understanding is -- maybe
20 not the exact legal definition -- it's what a person   09:29:05
21 of skill would understand that to mean in the art,
22 in the field.
23   Q   Is the term "network" a term of art?
24   MR. KAPLAN: Object to form.
25   THE WITNESS: Yes.   09:29:25

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7 (Pages 22 - 25)

1 BY MR. PAK:
2 Q Before you were engaged as an expert for this
3 matter, did you have an understanding of what
4 network means?
5 A Yes.   09:29:34
6 Q What was that understanding?
7 A Basically what I said a minute ago. A
8 network is an infrastructure of devices and
9 interconnects that allows the flow of data between
10 them. Or enables the flow of data between them.   09:29:54
11 Q Okay. So your definition of a network is the
12 same as a data network; is that correct?
13   MR. KAPLAN: Object to form.
14   THE WITNESS: I think -- a network carries
15 data, so yes.   09:30:19
16 BY MR. PAK:
17 Q Is "data" a term of art?
18 A Yes, it is.
19 Q Before Google engaged you as an expert in
20 this matter, did you have an understanding of what   09:30:41
21 data means?
22 A Yes, absolutely.
23 Q What was that understanding?
24 A Data is in its -- in the highest level
25 definition, data is information.   09:30:53

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1 Q Can data be analog or digital?
2 A Yes, absolutely.
3 Q Is "data network" a term of art?
4 A I would say yes.
5 Q Is there a difference between a network and a   09:31:18
6 data network?
7   MR. KAPLAN: Object to form.
8   THE WITNESS: In the context of what we're
9 speaking of, I would say no. There is a network of
10 people that I have on LinkedIn, but that's a   09:31:35
11 different kind of network. But in this context, I
12 would say no.
13 BY MR. PAK:
14 Q Would you say that a network and a data
15 network are both mediums that carry data?   09:31:54
16   MR. KAPLAN: Object to form.
17   THE WITNESS: In this context, yes.
18 BY MR. PAK:
19 Q Okay. What are the types of devices that can
20 be on a data network?   09:32:15
21   MR. KAPLAN: Object to form.
22   THE WITNESS: The types? What do you mean by
23 "types"?
24 BY MR. PAK:
25 Q Well, for example, you can have a laptop or   09:32:29

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1 laptops on a data network, correct?
2 A Correct.
3 Q Are there any other types of devices other
4 than a laptop that can be on a data network?
5 A Anything that allows the passage of data   09:32:45
6 through it that is connected to other devices can be
7 on a data network.
8   So in a studio environment, microphones and
9 loudspeakers are on a data network, and sometimes
10 over very long distances. The control room is in   09:33:06
11 another place. Obviously computers are on a data
12 network. Cell phones are on a data network. Yes.
13 And many other types of devices.
14 Q Sure. And a data network can be wired or
15 wireless, correct?   09:33:26
16 A Correct.
17 Q What are the types of cables or interfaces to
18 transfer data over a wired data network?
19   MR. KAPLAN: Object to form.
20   THE WITNESS: Over wired?   09:33:39
21 BY MR. PAK:
22 Q Yes. I -- well, I assume in a wireless data
23 network you wouldn't need cables, right?
24 A Right. Correct.
25   In a wired one, I mean, I guess anything that   09:33:51

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1 can establish electrical connection. So it would
2 be -- it could be copper, it could be optical, it
3 could be Ethernet. There's probably others that I'm
4 forgetting, but --
5 Q You mentioned earlier RCA cables, you can use   09:34:20
6 an RCA cable to --
7 A Yeah. Those fall into copper for me, but
8 yes.
9 Q Got it. What about speaker wires, does that
10 fall under copper?   09:34:33
11 A Also under copper.
12 Q Does a data network require devices to
13 transfer data in a certain format to communicate
14 with another device that is on the network?
15 A There has to be -- the devices have to   09:34:47
16 understand the data coming in. So if that is what
17 you mean by format, then yes. If not, there are
18 translator devices that can convert it.
19 Q Okay. So when a device transfers data to
20 another device on a data network, there's got to be   09:35:14
21 some kind of protocol, right?
22 A Yes.
23   MR. KAPLAN: Object to form.
24 BY MR. PAK:
25 Q What are the protocols that are required for   09:35:25

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8 (Pages 26 - 29)

1 a data network?

2   A   There's a pretty large number of them. A

3 common protocol is to -- is based on the principal

4 of modulation. Again, I'm speaking in the context

5 of our discussion today and the matters here.   09:35:45

6   So in a modulation concept, the modulation

7 type protocol is understood to take in data, put it

8 in a certain form so that the receiving device can

9 understand it. Since we're speaking of audio, pulse

10 code modulation is a common one.   09:36:14

11   There are optical protocols called SPDIF,

12 Sony Phillips Digital Interchange Format. There

13 are, of course, computer-to-computer protocols such

14 as Ethernet. And several others.

15   Q   Okay. Specifically if a device wants to   09:36:49

16 communicate with another device on an internet-based

17 network, what protocols are required for that

18 communication?

19   MR. KAPLAN: Object to form.

20   THE WITNESS: Can you define internet-based   09:37:10

21 network for me, please?

22 BY MR. PAK:

23   Q   Yeah. So communicate over Wi-Fi or Ethernet,

24 for example.

25   MR. KAPLAN: Object to form.   09:37:20

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1   THE WITNESS: Oh, I'm sorry. Did you say

2 Ethernet or internet?

3 BY MR. PAK:

4   Q   Wi-Fi or Ethernet.

5   A   Ethernet. I see.   09:37:29

6   Q   Yeah.

7   A   So the format for those is -- I mean, there's

8 a Wi-Fi standard under the 802.11 IEEE, Institute of

9 Electrical and Electronics Engineers, and that

10 standard has been established for -- the devices   09:37:52

11 that want to talk to each other on Wi-Fi have to

12 implement that standard on the transmitter and the

13 receiver so that they can communicate.

14   There are also standards for Ethernet. A

15 common one is TCP, Transfer Control Protocol. There 09:38:10

16 are others.

17   Q   Can you name some of the other protocols?

18   MR. KAPLAN: Object to form.

19   THE WITNESS: There are Asynchronous Transfer

20 Mode, ATM. Token Ring kind of networks. And a   09:38:43

21 variation of that, which is a Star network.

22   That's what comes to mind now. I'm sure I

23 can think of more later.

24 BY MR. PAK:

25   Q   Are there any other Wi-Fi standards other   09:39:18

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1 than 802.11?

2   A   Well, there are other Wi-Fi methods that are

3 proprietary to individual companies that may -- that

4 don't have to comply with 802.11 between their own

5 devices. I don't know how they work because they're 09:39:45

6 proprietary, but they do exist.

7   Q   And these protocols you mentioned, like

8 802.11, for example, or TCP, they require data to be

9 sent in a certain format; is that correct?

10   MR. KAPLAN: Object to form.   09:40:02

11   THE WITNESS: Those protocols, the standards

12 require, yes, data to be in a certain type. Just

13 like all the other protocols.

14 BY MR. PAK:

15   Q   Do the Wi-Fi and Ethernet standards require   09:40:17

16 data to be sent in data packets?

17   A   The 802.11 Wi-Fi does. The Ethernet, as I

18 said, you can -- Ethernet is basically the cable.

19 Different protocols can run on it. TCPIP is data

20 packets, yes. Or it's based on data packets.   09:40:37

21   Q   Are there any Wi-Fi Ethernet standards that

22 don't require data to be sent in the form of data

23 packets?

24   A   As I said, I don't know the Wi-Fi inner

25 workings of the proprietary ones, so I'm not sure I   09:40:58

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1 can answer that. Or the wired ones.

2   There are multi-room systems that have been

3 around in the home installer market for a long time

4 that use Ethernet. But it's not necessarily a

5 standard Ethernet, based on a standard. So I   09:41:16

6 couldn't say for sure what they use.

7   Q   Okay. And I want to introduce another

8 exhibit here. Just give me one minute.

9   A   Sure.

10   Q   Okay. I just uploaded Exhibit 2. Let me   09:41:33

11 know if you see it.

12   A   Yes. Okay.

13   (Exhibit 2 was marked for identification

14   electronically and is attached hereto.)

15 BY MR. PAK: 09:41:57

16   Q   Do you recognize this document?

17   A   No.

18   Q   Okay. Well, I'll represent to you that these

19 are slides from a computer networks course from

20 Cornell University that I downloaded from the   09:42:11

21 internet.

22   Do you see on the first page it says "CS519:

23 Computer Networks," correct?

24   A   I do.

25   Q   And it's a lecture from January 24, 2004,   09:42:18

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9 (Pages 30 - 33)

1 right?

2 　A　Yes.

3 　Q　Okay. And I want to focus on the slide 6, so

4 PDF page 6.

5 　A　They're not numbered. What is the title of　　09:42:35

6 the slide?

7 　Q　It says, "What is a data network?"

8 　A　I see it.

9 　　MR. KAPLAN: Chris, I don't mean to

10 interrupt, but if you sort of scroll your mouse over　09:42:48

11 the exhibit, it will show the page numbers there.

12 　　THE WITNESS: Yeah, I just realized. But for

13 some reason it's showing as page 5 for me. But,

14 okay, I do see it.

15 BY MR. PAK:　　　　　　　　　　　09:43:00

16 　Q　I guess it is page 5. Page 5 of the PDF.

17 　A　Yes.

18 　Q　And it says:

19 　　　"What is a data network?" And

20 　　then, "The answer is not a network　　09:43:09

21 　　that carries data."

22 　　Do you see that?

23 　A　I do.

24 　Q　And the slide explains that one reason why a

25 data network is not a network that carries data is　　09:43:20

Page 34

1 because you can send data over a voice network,

2 which is often a euphemism for a circuit network,

3 and a voice network is not a data network.

4 　　Do you see that?

5 　A　I do.　　　　　　　　　　09:43:36

6 　Q　Do you agree with that statement?

7 　A　Not at all.

8 　Q　Why do you disagree?

9 　A　I think it's an appropriate statement for a

10 packet network course -- for a network course, it's　09:43:44

11 appropriate for that kind of class, but I don't

12 think that's a general statement that is true

13 because data -- networks carry data. That's the

14 very definition of a network.

15 　　I don't know this class, but it sounds like　09:44:09

16 they're going to be talking about a subset of

17 networks that carry packet data, and they certainly

18 exist.

19 　Q　Well, you say you never taught a course in

20 computer networks; is that right?　　　　09:44:22

21 　A　Yes.

22 　Q　Do you agree that a voice network is a

23 euphemism for a circuit network?

24 　A　No. That is not a term of art.

25 　Q　Why do you disagree?　　　　09:44:32

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1 　A　First of all, I never heard that euphemism,

2 and I'm pretty familiar with the field of streaming

3 audio and networks and use for that, and voice. I

4 think a voice network is a data network. It's

5 carrying voice data.　　　　　　　09:44:59

6 　Q　Well, what is a voice network?

7 　A　It's a network that carries voice. For

8 example, a telephony network.

9 　Q　Could you give me some other examples of a

10 voice network?　　　　　　　　09:45:23

11 　A　If we're talking about a network that only

12 carries voice, then I think telephony is probably

13 the only one that comes to mind. There are other

14 networks that carry voice and other things, like

15 cellular networks and cell phone networks. But if　09:45:42

16 we're talking about just voice, then I would think

17 telephony is the -- I -- I just thought of another

18 one. A walkie-talkie network that has multiple

19 wireless devices that a firefighter department would

20 use, that is a voice network and it carries data.　09:46:01

21 　Q　So a walkie-talkie network, in your opinion,

22 is a data network?

23 　A　Well, I guess walkie-talkie network is --

24 walkie-talkie is the devices on a wireless network

25 that exchange voice data.　　　　　09:46:25

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1 　Q　And what protocol does this wireless network

2 use to exchange voice data?

3 　A　Most of them are based on radio frequency,

4 RF. But the protocols, again, I think are

5 proprietary to the individual companies that make　09:46:48

6 them, like Motorola and others.

7 　Q　And when you say a telephony network, are you

8 referring to a public switch telephone network?

9 　A　Yes.

10 　Q　Okay. So a public switch telephone network　09:47:05

11 is a voice network; is that right?

12 　A　Yes.

13 　Q　Is a cellular network a voice network?

14 　A　Well, as I said before, it can be a voice

15 network if all that anyone does on it is speak on　09:47:23

16 the phone. But it is capable of other information

17 as well on that network. So it's not exclusively

18 voice.

19 　Q　So a cellular network can either transmit

20 voice or data, right?　　　　　　09:47:36

21 　A　No.

22 　　MR. KAPLAN: Object to form.

23 　　THE WITNESS: Voice -- a cellular network

24 transmits or carries data. Voice is data as far as

25 it's concerned.　　　　　　　09:47:53

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10 (Pages 34 - 37)

1 BY MR. PAK:
2   Q Right. So a cellular network can carry data
3 in the form of voice, right, or non-voice data; is
4 that right?
5   A Right.   09:48:05
6   Q So how do you transmit voice data over a
7 cellular network?
8   A Well, it depends on what kind of cellular
9 network. There are different kinds of cellular
10 networks. So the first ever created was probably, I 09:48:25
11 would say, in Japan in 1979 or 1980, somewhere
12 there. And it was an analog-based system where --
13 and I guess at the time that would have been truly
14 for voice because I don't think there was other
15 multimedia data being sent over the network.   09:48:47
16   So that was through a mechanism called
17 frequency division multiplexing, which basically is
18 a protocol for splitting up the audio bandwidth into
19 different bands and then dividing them into
20 different bands, and then blending them all together 09:49:04
21 when they arrive at the other end. So that was a
22 purely analog system. And, actually, it's still in
23 existence in some parts of the world.
24   There are also digital systems, and they have
25 increased over the years from -- starting from 2G,   09:49:23

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1   Sitting here today, you can't think of a
2 digital cellular network that is not packet based,
3 correct?
4   A Correct, but that's not -- I'm not saying
5 that they don't exist, just that I can't think of   09:51:15
6 one.
7   Q So you said in a cellular network, you can
8 either transmit voice data or non-voice data, right?
9   A Right.
10   MR. KAPLAN: Object to form.   09:51:35
11 BY MR. PAK:
12   Q So in a cellular network, is -- is voice data
13 transmitted differently than non-voice data? Do
14 they take different paths?
15   MR. KAPLAN: Object to form.   09:51:50
16   THE WITNESS: Well, it kind of depends. If
17 you're communicating with somebody else on another
18 cellular phone, for example, the path between you
19 and the other person may be different because of the
20 way cellular networks work. If you're using your   09:52:09
21 phone to send data to a device in your house, that
22 would be a different path as well.
23   So I guess I wasn't fully clear on your
24 question.
25 ////

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1 which was the first one, all the way to what we have
2 today, which is 5G, increasing the bandwidth of each
3 connection and also total bandwidth to improve
4 quality and speed.
5   Q So in a digital cellular network, what --   09:49:47
6 when you transmit data, what -- what form does that
7 data take? Is -- does it have to take the form of
8 data packets?
9   A The standards dictate the form. So there are
10 different schemes. There's time division   09:50:16
11 multiplexing, which was the next evolution after
12 frequency division. I would say, yes, the majority
13 of those are probably packet based.
14   Q Are there any digital cellular networks that
15 are not packet based?   09:50:32
16   A I don't know. That would be a pretty
17 sweeping statement for me to make without looking
18 into it a little bit more.
19   I can't think of an example off the top of my
20 head, but I don't want to say no for sure because I   09:50:49
21 would have to look into it.
22   Q Sitting here today, you can't think of any
23 digital cellular networks that are packet based --
24 that are not packet based? Let me -- let me start
25 over.   09:51:04

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1 BY MR. PAK:
2   Q I want to go back to the slide here. It
3 says:
4   "Data network is often a
5   euphemism for packet network."   09:52:36
6   Do you agree with that statement?
7   A I do not.
8   Q And you disagree with the statement because a
9 data network is any type of network that carries
10 data; is that -- is that correct?   09:52:52
11   A That's correct. And the data can be in many
12 different forms and it could be analog or digital.
13 But even within those, it can be different protocols
14 for each one of those.
15   Q Is a voice network a packet network?   09:53:06
16   MR. KAPLAN: Object to form.
17   THE WITNESS: A voice network can be packet
18 based, yes. But there are many -- the original
19 PBX-type switches were not. Those were a voice
20 network that was analog. And then later other   09:53:31
21 networks came out that are digital.
22   But analog voice networks still exist and are
23 in use in many places, including elevators for
24 safety and places where you want the internet not to
25 fail, especially for safety applications.   09:53:47

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11 (Pages 38 - 41)

1 BY MR. PAK:
2   Q   Okay. So an analog voice network is not a
3 packet network, correct?
4   A   An analog -- no, it is not.
5   Q   Is a digital voice network a packet network?   09:54:01
6   A   As I said before, most of them are. There
7 might be examples where they're not, but I don't
8 know one off the top of my head. I would say most
9 are.
10   Q   And I want to take a look at -- let me find   09:54:20
11 the right slide here. I think it's PDF page 9 of
12 the slides. The header says "Packet Network versus
13 Circuit Network."
14   Do you see that?
15   A   Yes.   09:54:44
16   Q   So this slide says:
17   "Packet Network versus Circuit
18   Network. By contrast, packet network
19   allows small units of data packets to
20   be individually sent to different   09:54:55
21   destinations."
22   Do you see that?
23   A   I do.
24   Q   Can you send data packets over a circuit
25 network?   09:55:04

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1   destinations."
2   Yes, I would agree with that.
3 BY MR. PAK:
4   Q   Can a circuit network be digital or analog?
5   A   Yes.   09:56:39
6   Q   What's an analog -- what are some examples of
7 analog circuit networks?
8   A   Well, those are the original telephony
9 products that connect to POTS, plain old telephone
10 system lines. You still find limited -- you find   09:56:56
11 them in network closets of many companies or other
12 organizations. So, yes, there are analog switching
13 or circuit networks that still exist.
14   Q   You said those are examples of an analog
15 voice network, right?   09:57:31
16   A   Right.
17   Q   So is a voice network not a circuit network?
18   A   A voice network --
19   Q   Let me ask you a different question.
20   Is a voice network synonymous -- synonymous   09:57:49
21 with the term circuit network?
22   A   No.
23   Q   How are they different?
24   A   A circuit network is something that requires
25 a physical connection to be made of the sending   09:58:02

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1   A   Probably not. I'm trying to figure out what
2 the "by contrast" means here. Is there a previous
3 slide that contrasts to something?
4   Q   Yeah. So in the context, you know, the
5 header says, "Packet Network versus Circuit   09:55:32
6 Network." So "by contrast" here it's comparing a
7 packet network to a circuit network; is that
8 correct?
9   A   Yes.
10   Q   So unlike a circuit network, this slide says: 09:55:42
11   "A packet network allows small
12   units of data packets to be
13   individually sent to different
14   destinations."
15   Is that right?   09:55:59
16   MR. KAPLAN: Object to form.
17   THE WITNESS: Right. But -- so in a digital
18 switching -- a digital circuit network, that could
19 also be true, right?
20   So I understand what they're trying to say   09:56:15
21 here for the purposes of this class that they're
22 teaching, but I guess reading the sentence by
23 itself:
24   "A packet network allows packets
25   of data to be sent to different   09:56:30

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1 location and the receiving location. You think of
2 it as the old telephone operator plugging in patch
3 cords. So that's a circuit network. What it
4 carries is voice. And so I guess it's not a term
5 that I often use, but it is a term that I guess   09:58:21
6 people use calling it a voice network. You could
7 send other things over an analog switching network.
8   Q   And you said earlier that public switch
9 telephone network is a voice network, right?
10   A   I said -- I don't remember what I said. The   09:58:41
11 public switch network can be used as -- for voice.
12   Q   Can a public switch telephone network be used
13 in a circuit network?
14   MR. KAPLAN: Object to form.
15   THE WITNESS: It's not to be used in. It's   09:59:05
16 implemented using circuit networks, or circuit
17 network devices.
18 BY MR. PAK:
19   Q   Well, let me ask you this way. Is a voice
20 network a type of circuit network?   09:59:28
21   A   Yes.
22   Q   Okay. I want to introduce a new exhibit
23 here, Exhibit 3. Just give me one minute.
24   (Exhibit 3 was marked for identification
25   electronically and is attached hereto.)   10:00:11

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12 (Pages 42 - 45)

1 BY MR. PAK:
2   Q   Okay. I just uploaded Exhibit 3. Let me
3 know when you see it.
4   A   I see it.
5   Q   Do you recognize this document?   10:00:23
6   A   I recognize maybe not this edition of it, but
7 I have seen the computer dictionary before, yes.
8   Q   Okay. Yeah, so this is an excerpt from the
9 Microsoft Computer Dictionary, Fifth Edition.
10   And you said you're not sure if you read this   10:00:44
11 edition, but you've looked through the Microsoft
12 Computer Dictionary before, right?
13   A   Yes, I have.
14   Q   I want to look at page 3. At the bottom, do
15 you see a definition for a data network?   10:01:04
16   A   Yes.
17   Q   Could you please read that definition for the
18 record?
19   A
20   "A network designed for   10:01:15
21   transferring data encoded as digital
22   signals, as opposed to a voice
23   network, which transmits analog
24   signals."
25   Q   So like the Cornell University slide we just   10:01:25

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1 looked at, the Microsoft Dictionary distinguishes a
2 data network from a voice network, correct?
3   MR. KAPLAN: Object to form.
4   THE WITNESS: That's what it says.
5 BY MR. PAK: 10:01:48
6   Q   Do you agree with this definition of data
7 network from the Microsoft Computer Dictionary?
8   A   I agree with parts of it. A network designed
9 for transferring data. But I don't agree that it
10 has to be digital.   10:02:00
11   Q   What does transferring data mean?
12   A   In this context, I think because it's
13 Microsoft, it means -- I assume it means data from
14 one computer is moved to another computer.
15   Q   So it talks about sending and receiving data,   10:02:31
16 right?
17   A   I don't -- maybe transferring means -- to me
18 means taking it from one place to another. I don't
19 see anything in this definition that implies it's
20 bidirectional.   10:02:53
21   Q   What do you mean by "bidirectional"?
22   A   Sending and receiving, as you said, between
23 two devices, for example.
24   Q   Okay. So this definition, you disagree that
25 a data network is limited to digital signals, right?   10:03:29

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1   A   Correct.
2   Q   Why do you disagree?
3   A   Because I think we talked about several
4 examples of networks that carry analog signals, and
5 so it's not an opinion. I mean, the existence of   10:03:47
6 those networks proves it doesn't have to be digital.
7   Q   And earlier, you know, as we discussed, your
8 opinion is that a voice network can transmit analog
9 signals, but it can also transmit digital signals;
10 is that correct?
11   A   Yes.
12   MR. KAPLAN: Object to form.
13   THE WITNESS: Yeah, I agree with that.
14 BY MR. PAK:
15   Q   Okay. Is local area network a term of art?   10:04:17
16   A   Yes, it is.
17   Q   Before Google engaged you as an expert for
18 this matter, did you have an understanding of what
19 local area network means?
20   A   Yes, I did.   10:04:31
21   Q   What was that understanding?
22   A   It is a -- again, infrastructure or medium
23 for connecting multiple devices for the purpose of
24 exchanging data.
25   Q   What are the types of devices that can be on   10:04:50

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1 a local area network?
2   A   They can be -- because I work a lot with
3 studios and other things, it can be mixing consoles,
4 loudspeakers, computers, microphone preamplifiers,
5 printers. There's a very large list of things it   10:05:16
6 could be on this kind -- on a local area network.
7   Q   A local area network can be wired or
8 wireless, correct?
9   A   Yes.
10   Q   What are the types of cables used to transfer   10:05:29
11 data over a wired local area network?
12   A   It's similar to the list that we talked about
13 before in terms of data networks. It's copper and
14 all types of copper connections, including audio
15 cables, speaker cables, Ethernet, coaxial cables,   10:05:53
16 optical cables. That's probably a good list.
17   Q   So if a speaker is connected to the Sub
18 Equalizer, for example, via a RCA cable -- let me
19 start over.
20   So if a speaker is connected to another   10:06:24
21 device, such as the Sub Equalizer via RCA cables, is
22 that on a local area network?
23   A   Yes. Those are exchanging data.
24   Q   Does a local area network require devices to
25 transfer data in a certain format to communicate   10:06:51

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13 (Pages 46 - 49)

1 with another device?
2   A   It does. The devices on that network have to
3 all have an agreed-upon representation of the data
4 or use an appropriate translator to make it
5 understandable to them, but yes.   10:07:08
6   Q   So devices on a local area network have to
7 communicate using a specific network protocol,
8 right?
9   A   Yes.
10   Q   What are those network protocols?   10:07:25
11   A   So there are -- again, because I come from
12 the audio world, there are modulation protocols,
13 such as pulse code modulation, pulse width
14 modulation, optical data protocols, which are
15 digital. Well, all the ones I mentioned are   10:07:49
16 digital.
17   And then there are also the -- if we're
18 talking about printers and computers, then there are
19 the TCP internet protocols.
20   Q   Are these analog protocols or digital   10:08:04
21 protocols?
22   A   Well, I guess I don't think of a protocol as
23 analog or digital. It's -- there are protocols for
24 analog data and there are protocols for digital
25 data. Perhaps that's what you meant?   10:08:36

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1   Q   Yeah, that's what I meant, actually.
2   What are the protocols for analog data for a
3 local area network?
4   A   So they're modulated -- so FM is -- not the
5 radio kind of FM, but frequency or amplitude   10:09:02
6 modulation of audio data can be sent over cables and
7 demodulated at the receiving side and be converted
8 back to audio. That's one that comes to mind for
9 analog.
10   Q   Are there any other protocols for analog data   10:09:26
11 over a local area network?
12   A   The method that I talked about before for the
13 1G cellular networks, frequency division
14 multiplexing, that can also be applied to wired
15 local area networks as well.   10:09:50
16   Q   What are the protocols for digital data over
17 a local area network?
18   A   It depends on the data. So if it's -- again,
19 if we're talking about multimedia audio data, those
20 can be the ones that I mentioned before, the pulse   10:10:12
21 code or pulse modulation or optical, SPDIF.
22   If we're talking about computers and
23 printers, those are TCP-type protocols. But there
24 are others. There are peer-to-peer connections that
25 can happen.   10:10:36

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1   Q   When you transmit digital data over a local
2 area network, does that data have to take the form
3 of digital data packets?
4   A   No, it doesn't have to.
5   Q   What other forms can that data take?   10:11:00
6   A   The examples I was giving before, some kind
7 of a modulation. So pulse code or pulse width
8 modulation. So, no, it doesn't have to be packet
9 based.
10   Q   When we talked about modulations, you   10:11:30
11 referred to them as analog data; is that right?
12   A   No. The one kind, frequency division, is the
13 analog. But the -- so pulse code and pulse width,
14 the examples I'm using here, require the translator
15 device.   10:11:54
16   So let's say you have an audio device that's
17 sending out analog audio, but you want to connect it
18 over a local network to other devices to receive
19 that audio, the wired network. You might convert it
20 to digital audio and then use -- and that conversion 10:12:16
21 puts it in the forms of pulse code modulated or
22 pulse width modulated audio. Most common is pulse
23 code. It's sent over the network in that format and
24 then the opposite operation happens at the receiving
25 end.   10:12:37

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1   So these converter devices are in many cases
2 built into the audio source and receiver and
3 sometimes they can be separate.
4   Q   So when you convert audio into digital form
5 in pulse code modulator or pulse width modulated   10:12:55
6 audio data, and you transmit that over a network,
7 does that data have to take the form of data
8 packets?
9   A   No.
10   Q   What does that data -- what form can that   10:13:19
11 data take other than data packets?
12   A   You can think of it as a stream of zeroes and
13 ones because it's digital now.
14   I guess the best analogy I can think of is in
15 Morse code you can have a long beep or a short beep, 10:13:39
16 and so the pulses can be wide to represent, let's
17 say, a one or short to represent a zero and then
18 that pattern is read in by the receiving device and
19 converts back to audio.
20   Q   Does an infrared remote that sends infrared   10:14:00
21 signals to a TV amount to a coupling by way of a
22 local area network?
23   A   Yes. It's sending data to a TV in this case,
24 right? So over an agreed-upon protocol. So yes.
25   Q   So as long as data is being carried over to   10:14:36

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14 (Pages 50 - 53)

1 another device using some agreed-upon protocol,
2 you're saying that that is enough to be on a local
3 area network; is that right?
4   MR. KAPLAN: Object. Form.
5   THE WITNESS: It's enough to be on a network. 10:14:55
6 Local area usually is used as a term of art to
7 differentiate it from larger networks. But, yes, I
8 agree.
9 BY MR. PAK:
10   Q What do you mean by a local area usually is   10:15:16
11 usually used as a term of art to differentiate it
12 from large networks?
13   A The industry uses these terms to give an idea
14 of the magnitude of the size of the overall network.
15 So they are, for example, wide area networks that   10:15:41
16 would consist possibly of multiple local area
17 networks and are generally considered to cover much
18 larger areas geographically. So it's kind of a
19 layered terminology. There are also metropolitan
20 area networks that typically are associated with a   10:16:03
21 city.
22   There's no hard definition of where the
23 boundary of one ends and another one begins, but one
24 would understand that a wide area network involves a
25 much larger geographic area than a local area   10:16:16

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1 network.
2   Q So local area network covers a limited area
3 compared to a wider network; is that right?
4   A I wouldn't say limited. It's just smaller
5 than the wide area network. All networks are   10:16:42
6 limited by area. Wide area networks are also
7 limited, perhaps to planet earth. But it's just a
8 terminology for relative size. So one would
9 understand a local area network has fewer devices on
10 it than a wide area network.   10:16:57
11   Q Let me ask you this way, then. A local area
12 network covers a limited geographical area; is that
13 right?
14   A As I said, a smaller geographic area. It can
15 be quite large. That's why I objected to "limited."   10:17:16
16 It can be pretty big. And then you say, okay, what
17 about wide? Wide area network would be bigger.
18   Q Correct, right. So local area network covers
19 a smaller geographical area than a wide area
20 network; is that right?   10:17:32
21   A Yes.
22   Q Is there a difference between a data network
23 and a local area network?
24   A Well, a local area network is a subset of the
25 data networks.   10:17:56

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1   Q Right. So there is a difference between a
2 data network and a local area network, right?
3   A No. A local area network is a data network.
4 But it has this additional attribute that is used to
5 compare it to larger data networks, which are called   10:18:13
6 wide area networks.
7   Q What is -- where are those additional
8 attributes that make a data network a local area
9 network?
10   A They are used in -- when making comparisons   10:18:27
11 between two networks to differentiate usually by the
12 number of devices or the geographical area that is
13 covered.
14   So they're all data networks, but the wide --
15 it's generally understood that a wider network has   10:18:48
16 many more devices or covers a wider geographical
17 area than a local area network.
18   Q Are there any other additional attributes
19 that make a data network a local area network?
20   A Not that I can think of at the moment, no.   10:19:04
21   Q Do you know any examples of a wide area
22 network?
23   A Yes. I don't know if there's a name for it,
24 but the Western United States internet
25 infrastructure is generally considered a wide area   10:19:37

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1 network. Internet2 that we mentioned before is a
2 wide area network.
3   Q Do you know any other examples of wide area
4 networks?
5   A I would say satellite networks perhaps that   10:19:51
6 cover a part of the globe under their view are also
7 wide area networks.
8   Q How do you transmit data over a satellite
9 network?
10   A In multiple ways. It could be radio   10:20:22
11 frequency based modulation or it could be packet
12 based, like it is for cell phones or cell networks.
13   Q Can you transmit analog data over a satellite
14 network?
15   A Analog data -- I'm trying to think of -- for   10:20:41
16 example, a short-wave radio is a kind of a network
17 that uses analog data over large distances. It's
18 possible that it's rebroadcast through satellites.
19 I'm not sure. I think technically you can.
20   I can't think of an example at the moment,   10:21:13
21 but there's no reason that you couldn't.
22   Q Do you know any satellite networks that
23 transmit analog data?
24   A Not off the top of my head. I mean, I know
25 an old example -- communication with the Apollo   10:21:33

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15 (Pages 54 - 57)

1 astronauts was done through radio waves. Perhaps
2 eventually that became digital. But, no, I can't
3 think of an example off the top of my head.
4   Q Does data that is transmitted over a
5 satellite network have to take the form of data   10:21:55
6 packets?
7   A I don't think that's required, no.
8   Q What other forms of data can be transmitted
9 over a satellite network?
10   A There are other modulation schemes that can   10:22:09
11 be used. Radiofrequency modulation schemes can be
12 used to transmit data over satellites.
13   MR. PAK: How about we take a break, a quick
14 break? Maybe come back in five minutes. Is that
15 okay?   10:22:41
16   THE WITNESS: Sure.
17   THE VIDEOGRAPHER: We are off the record at
18 10:22 a.m.
19   (Recess.)
20   THE VIDEOGRAPHER: We are on the record at   10:30:10
21 10:30 a.m.
22 BY MR. PAK:
23   Q Dr. K., I want to explore a couple more
24 examples regarding local area networks.
25   A Okay. Before we get started, before you ask   10:30:25

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1 your question, I -- as I was walking upstairs, I
2 thought of an example, if I could amend my previous
3 answer.
4   An example of analog communication over
5 satellites is of course the obvious one, broadcast   10:30:38
6 television. Early days of broadcast television was
7 analog signals being sent over satellite. That's an
8 obvious one. Okay.
9   Q Does a cell phone communicate with a
10 Bluetooth headset amount to a coupling by way of   10:31:07
11 local area network?
12   A Yes.
13   Q Wasn't Bluetooth a type of personal area
14 network?
15   A Again, these definitions are kind of   10:31:26
16 arbitrary in the sense that there is no hard line of
17 distance that goes from one to the other. It's a
18 small local area network, but if I have a speaker 20
19 feet away from me communicating by Bluetooth, then
20 maybe that could be a local area network. It's not   10:31:46
21 a hard definition.
22   Q Does local area network cover a broader
23 geographical area than a personal area network?
24   A By consensus of people in the field thinking
25 of it that way. It's not something technical that   10:32:07

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1 causes that. But yes.
2   Q Are there any other differences between a
3 local area network and a personal area network?
4   A Probably the number of devices in a local
5 area network would be higher than the number of   10:32:24
6 devices in a personal area network that are
7 possible.
8   Q Are there any other differences between local
9 area network and a personal area network?
10   A I can't think of one, no.   10:32:36
11   Q So earlier you said, you know, communicating
12 over two walkie-talkies could amount to a coupling
13 by way of a data network, right?
14   A Yes.
15   Q And that's because you can carry data from   10:33:04
16 one walkie-talkie to another walkie-talkie, correct?
17   A Correct.
18   Q What if I just had, you know, two cups on a
19 string and I used that to communicate with George,
20 who is right by me, is that on a data network?   10:33:25
21   MR. KAPLAN: Object to form.
22   THE WITNESS: That's a bit of an extreme
23 example, but if your voice carried over the string
24 and the string was carefully selected and there was
25 no background noise, yeah, it's data. Your data is   10:33:46

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1 getting across to somebody else to another device.
2 Not a very sophisticated one, but yes.
3 BY MR. PAK:
4   Q So as long as two devices or two nodes carry
5 data, that's going to be on a data network, in your   10:34:02
6 opinion?
7   A Yes.
8   MR. PAK: Okay. I'm going to introduce
9 Exhibit 4. I actually uploaded it on the break and
10 marked it as Exhibit 4. Just let me know when you   10:34:27
11 see it.
12   THE WITNESS: I see it.
13   (Exhibit 4 was marked for identification
14   electronically and is attached hereto.)
15 BY MR. PAK: 10:34:45
16   Q Do you recognize this document?
17   A Yes.
18   Q This is your -- this is one of your
19 publications; is that right?
20   A That's right.   10:34:51
21   Q And the title says, "RMI System: Internet
22 Meets the Future Home Theater," right?
23   A Correct.
24   Q At a high level, what is this publication
25 about?   10:35:07

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16 (Pages 58 - 61)

1   A   This describes a set of experiments that
2   actually relates to the Internet2 discussion that we
3   had earlier. RMI stands for Remote Media Immersion.
4   And for several years there was -- I was a faculty
5   investigator and then eventually a deputy director   10:35:30
6   of the National Science Foundation Engineering
7   Research Center that was established at USC, and
8   this was one of the kind of capstone experiments
9   that we did to push the limits of multimedia at the
10 time. This was in the late 1990s.   10:35:47
11   And so this paper talks about what
12 technologies would you -- would one need and how
13 would we use them to deliver what appears like high
14 quality representation of reality to somebody that
15 is far away.   10:36:06
16   Q   What was your contribution with respect to
17 this paper?
18   A   So several parts. It was the algorithms for
19 capturing audio on one end. Algorithms for
20 delivering it on the other end. Those were, I would   10:36:32
21 say, individual contributions.
22   And then there were collaborative
23 contributions in working with the researchers and
24 computer networks to develop methods together that
25 met the requirements of multichannel audio,   10:36:48

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1   immersive audio, that were very different from the
2   requirements of sending faxes and e-mails in terms
3   of quality of service, forward error correction, and
4   other things like that.
5   Q   Okay. And I want to look at PDF page 4,   10:37:12
6   Figure 1.
7   Do you see that?
8   A   Yes.
9   Q   Did you design this architecture shown in
10 Figure 1?   10:37:29
11   A   This architecture is -- this is all
12 off-the-shelf equipment. It's computers and hard
13 disks and Ethernet switch and computers at the other
14 side. So this was not -- we discussed how to put
15 them together and all agreed that this is how we   10:37:58
16 would need to do it in order to achieve our goal.
17 But the individual pieces are off-the-shelf
18 components.
19   Q   Okay. And, you know, I want to take a look
20 at the bottom of page -- PDF page 3 here, the last   10:38:12
21 paragraph. It says:
22   "Figure 1 (next page) shows the
23   server cluster architecture, which can
24   harness the resources of many nodes
25   and many disk drives per node   10:38:26

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1   concurrently."
2   Then the last sentence on that page says:
3   "Each cluster node is attached to
4   a local network switch with a fast or
5   Gigabit Ethernet link. The nodes   10:38:41
6   communicate with each other and send
7   the media data via these network
8   connections. We connected the local
9   switch to both a wide area network
10 backbone to serve distant clients and   10:38:51
11 a local area network, LAN, environment
12 with local clients."
13   Do you see that?
14   A   I do.
15   Q   So looking at Figure 1, what are the cluster   10:39:05
16 nodes?
17   A   What are in terms of --
18   Q   What are the cluster nodes with respect to
19 Figure 1? Can you point to them or show me -- tell
20 me --   10:39:28
21   A   It's the ones that are labeled Node 0,
22 Node 1, Node 2, Node N. It was scalable.
23   Q   What is a node?
24   A   A node is I think a network -- people speak
25 for a connection of a device to the point of   10:39:53

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1   connection between a device like a computer or
2   server to the network.
3   Q   And a local switch described in your
4   publication is the Ethernet switch shown in
5   Figure 1; is that right?   10:40:10
6   A   Right.
7   Q   And the internet showing here in Figure 1
8   represents the wide area network backbone described
9   in your publication; is that right?
10   A   Correct.   10:40:22
11   Q   Does Figure 1 also depict a local area
12 network environment with local clients?
13   A   Well, the personal computers shown there are
14 on a local area network. The ones where the nodes
15 were indicated.   10:40:45
16   Q   So the nodes here represent personal
17 computers; is that right?
18   A   I think node is a term which -- it's the
19 device -- nodes to me represent connections, the
20 connection points. They happen to be parts of a   10:41:11
21 computer, an interface that the computer has to
22 create that node.
23   So I wouldn't -- the computer itself is not
24 the node. I think the fact that it has a connection
25 at that point makes -- creates a node as kind of an   10:41:31

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17 (Pages 62 - 65)

1 entryway to that network.
2   Q   I want to take a look at the bottom
3 paragraph, the left column of PDF page 4. The last
4 sentence says:
5   "VBR streams enhance the   10:41:54
6   rendering quality, but they generate
7   bursty traffic on a packet-switched
8   network such as the Internet. In
9   turn, this can easily lead to packet
10   loss due to congestion."   10:42:04
11   Do you see that?
12   A   Yes.
13   Q   Your publication here teaches that the
14 Internet is a packet network, correct?
15   A   Yes.   10:42:14
16   Q   Looking at the last sentence of the next
17 paragraph, it says:
18   "To avoid traffic bottlenecks,
19   each node transmits the data blocks
20   that it holds directly to the clients   10:42:29
21   via RTP. Hence, each client will
22   receive RTP data packets from each
23   server node within the cluster."
24   Do you see that?
25   A   I do.   10:42:41

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1   Q   What is RTP?
2   A   I think it's retransmission protocol. It's a
3 type of protocol that enables error correction. In
4 case there are lost packets, they are re-requested
5 before they're stitched back together to avoid   10:43:00
6 dropouts.
7   This was one of the big things we had to
8 worry about. You don't want audio dropouts. It
9 does not make for a high-quality experience.
10   Q   Is RTP a type of internet protocol?   10:43:12
11   A   No. I would say UDP is an internet protocol,
12 User Datagram Protocol, UDP is a type of internet
13 protocol. And you can enable, if you will, or
14 include in it a method like RTP that provides for
15 the ability to correct errors that happen because of   10:43:43
16 lost packets.
17   Q   Does UDP require data to be transmitted or
18 received in the form of data packets?
19   A   Yes.
20   Q   So does RTP, right?   10:43:59
21   A   RTP is -- it's not a transmission -- it's not
22 the same. Yes, RTP operates on packets to figure --
23 and requests retransmission of ones that are missing
24 based on what it was expecting, in simple terms.
25   Q   Okay. So looking at Figure 1, the nodes   10:44:26

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1 shown in Figure 1 transmit data packets over a wide
2 area network; is that correct?
3   A   Well, they first go over a local area network
4 into the switch, and then the switch multiplexes
5 them all together and puts them onto the line that   10:44:55
6 goes to the wide area network, as shown at the top
7 through fast Ethernet or Gigabit Ethernet.
8   Q   Sure. So let me correct that here.
9   So nodes communicate with the Ethernet switch
10 over a local area network, correct?   10:45:09
11   A   Correct.
12   Q   And these nodes send data packets to the
13 internet switch; is that correct?
14   A   Yes. In this architecture, yes.
15   Q   And in this architecture, the Ethernet switch 10:45:21
16 connects to the -- or communicates over the internet
17 and sends data packets over the internet; is that
18 correct?
19   A   Right. Where it says "internet backbone
20 routers," those are -- exist -- there's a connection 10:45:39
21 in USC's IT building and that's -- so if we went
22 from there to that router, then that router then has
23 a direct line to the wide area internet. In this
24 case, it was Internet2. Not the general internet,
25 but a similar type of network.   10:45:58

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1   Q   Okay. I want to introduce Exhibit 5 here.
2 Give me one second.
3   Okay, I just uploaded Exhibit 5 and marked it
4 as Exhibit 5. Let me know when you see it.
5   A   I see it.   10:46:21
6   (Exhibit 5 was marked for identification
7   electronically and is attached hereto.)
8 BY MR. PAK:
9   Q   Do you recognize this document?
10   A   Yes. It's one of my patents.   10:46:33
11   Q   So you're a co-inventor of this patent,
12 correct?
13   A   Yes.
14   Q   And the patent number is 8,705,764, right?
15   A   Yes.   10:46:47
16   Q   At a high level, what does this patent
17 generally disclose?
18   MR. KAPLAN: Object to form.
19   THE WITNESS: We were trying to solve a
20 problem that happens when you take audio -- you   10:47:05
21 start with analog audio and then you digitize it
22 into a high quality digital form. And then in order
23 to store it perhaps on a portable device, one of
24 many different data compression algorithms are used.
25 MPEG being the most popular, but there are others   10:47:30

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18 (Pages 66 - 69)

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1 like AAC.
2   The result of that compression is that the
3 higher frequencies of sound that were in the
4 original tend to be discarded in the name of
5 bandwidth savings. And so this patent teaches a   10:47:44
6 method to recreate the lost high frequencies using
7 information that is in the lower frequencies that
8 did not get discarded.
9 BY MR. PAK:
10   Q I want to focus on Column 11. It's on PDF   10:48:04
11 page 21, lines -- lines 55 to 60. It's the last
12 sentence before the last paragraph.
13   Could you please read those lines for me for
14 the record.
15   A Is this the "Various embodiments" paragraph?   10:48:25
16   Q The sentence right above it.
17   A "The connectivity between the modules"? That
18 one?
19   Q Yes, that one.
20   A Okay.
21   "The connectivity between the
22   modules and/or components within the
23   modules may be provided using any one
24   of the connectivity methods and media
25   that is known in the art, including,   10:48:52

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1   but not limited to, communications
2   over the internet, wired or wireless
3   networks using the appropriate
4   protocols."
5   Q So it talks about communications over the   10:49:01
6 internet using the appropriate protocols. What are
7 the appropriate protocols communicated over the
8 internet?
9   A It's been a little while since I've seen
10 this, so just give me a second to take a look and   10:49:18
11 put it in context.
12   Q Sure. Go ahead, take your time.
13   A Yeah. Okay. It's all coming back.
14   Q Okay. So let me re-ask the question here.
15   What are the appropriate protocols to   10:50:17
16 communicate over the internet?
17   A It's what we talked about before. If it's
18 the internet as we have it today, it's TCPIP or
19 peer-to-peer or UDP, as we just saw.
20   Q Are there any other protocols?   10:50:39
21   MR. KAPLAN: Object to form.
22   THE WITNESS: There are others. There's --
23 let's see. OSI is another one, Open System
24 Interfaces. There are probably others I'm not
25 remembering. There are a number of these internet   10:51:11

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1 protocols.
2   To be clear, the patent is really not about
3 connecting -- it's just saying that the modules that
4 we're discussing here that are going to do advanced
5 audio processing don't necessarily have to be in one   10:51:30
6 device, they can be spread out, distributed. That
7 was the point of that paragraph.
8 BY MR. PAK:
9   Q What is the OSI protocol?
10   A It's a -- the best way to describe it, it's   10:51:48
11 an attempt at abstracting the individual layers that
12 are required in a network system all the way from
13 the hardware layer to the firmware to the software
14 that needs to run on top of it, to the physical
15 connections, in a way that provides a more uniform   10:52:16
16 way for people that are trying to send data over
17 these kinds of networks without having to know
18 exactly what type of device was there.
19   So it moves it up to be a more abstract
20 representation of the interface of the network. I   10:52:34
21 believe there are seven layers in it that -- in that
22 stack.
23   Q Does the data that is transmitted using the
24 OSI protocol require data packets, data transmitted
25 in the form of data packets?   10:53:01

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1   A Yes, it's a packet-based system.
2   Q Okay. I want to look at Column 9, lines 20
3 to 24 of your patent. And I'm just paraphrasing
4 here, but it says that the output is characterized
5 by a transfer function.   10:53:27
6   Do you see that?
7   A I do.
8   Q What does the term "characterize" mean?
9   A In this context it means that -- so we're
10 talking about a system. A system has inputs and   10:53:43
11 outputs. And typically when you do system analysis,
12 you want to find a way to describe the output in
13 terms of the input signal.
14   And so the transfer function in this context
15 says that if I have -- if I know what the amplitude   10:53:58
16 level was to this box and I know what the transfer
17 function is, then I can tell you what the output is.
18   Q Do you know any words or phrases that are
19 synonymous with the term "characterize"?
20   MR. KAPLAN: Object to form.   10:54:17
21   THE WITNESS: I'm trying to think of it in
22 this context, and not just generally.
23   What it really means here is mathematically
24 described. Because we're talking about this
25 equation here. That would be the closest I can   10:54:41

19 (Pages 70 - 73)

1 think of.
2 BY MR. PAK:
3   Q Can you think of any other words or phrases
4 that are synonymous with "characterize"?
5   A Not off the top of my head, no.   10:54:53
6   Q But "describe" would be one of the terms that
7 is synonymous with "characterize," right?
8   MR. KAPLAN: Object to form.
9   THE WITNESS: Yeah, but I don't want to -- in
10 math we say mathematically described, so I would be   10:55:11
11 more comfortable keeping it that way.
12 BY MR. PAK:
13   Q What about defined?
14   MR. KAPLAN: Object to form.
15   THE WITNESS: Defined has a different meaning   10:55:24
16 to me. A definition in math or applied math means
17 that you're making some assumptions and defining
18 them. But that's not what is happening here.
19   This is a -- an equation that has certain
20 elements. And so the system is characterized by   10:55:47
21 this transfer function. So I think describe
22 mathematically is more accurate.
23 BY MR. PAK:
24   Q What if I say -- what if we change "the
25 output is characterized by a transfer function" to   10:56:04

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1 "the output is represented by a transfer function,"
2 would that be accurate?
3   MR. KAPLAN: Object to form.
4   THE WITNESS: I don't think so because
5 "represented" to me means it's not the thing, but   10:56:23
6 it's being represented by something else. And
7 that's not technically correct here. This H
8 function is the function.
9 BY MR. PAK:
10   Q What if you say "the output indicates a   10:56:42
11 transfer function," would that be incorrect?
12   A No. That would be something completely
13 different and it would indicate that there might be
14 an output or something, but that's not -- this is a
15 deterministic system, and so no.   10:57:00
16   Q Well, looking at the equation here, the
17 output Y equals the transfer function times the
18 sinusoid input, S-I-N-U-S-O-I-D.
19   So the output function here indicates the
20 transfer function and the sinusoid input, right?   10:57:35
21   A No.
22   Q It provides some kind of indication of it?
23   A No, no. This is a way to calculate the
24 output function. So it is calculated by multiplying
25 the transfer function with the complex sinusoid.   10:57:53

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1   Q Okay. Let me try to introduce another
2 exhibit here.
3   I just uploaded a new exhibit and marked it
4 as Exhibit 6. Let me know when you see it.
5   A I see it.   10:58:25
6   (Exhibit 6 was marked for identification
7   electronically and is attached hereto.)
8 BY MR. PAK:
9   Q Do you recognize this document?
10   A Yes, it is another one of my publications.   10:58:35
11   Q The title of the publication is "High Quality
12 Multichannel Audio Over the Internet," right?
13   A Yes.
14   Q What was your contribution to this
15 publication?   10:58:51
16   A These are two students in the center. One of
17 them was in my group and the other one was in the
18 networking group. And this was a paper that --
19 similar to the previous one, it was trying to figure
20 out ways to transmit high quality audio over the   10:59:09
21 internet.
22   And the reason that it was an interesting
23 topic was that it was really not possible to
24 transmit high quality audio over the internet, at
25 least not in the early days. And so this paper   10:59:23

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1 shows some ways of doing that.
2   Q Let's take a look at the abstract. The
3 second sentence here says:
4   "We present a robust scalable
5   architecture for delivering   10:59:44
6   uncompressed multichannel audio over
7   high bandwidth ATM networks."
8   Do you see that?
9   A I do.
10   Q Is an ATM network a type of data network?   10:59:54
11   A Yes.
12   Q Is that because an ATM network carries data?
13   A Actually, I should revise it.
14   ATM network is a -- is a protocol for
15 transmitting data over data networks. It stands for 11:00:10
16 Asynchronous Transfer Mode, so it's a method of
17 transmitting data over networks, over data networks.
18   Q So an ATM network is not an actual network,
19 it's a protocol; is that right?
20   A Right. There's a -- there's a network   11:00:29
21 architecture that has connectors and switches and
22 things that have to support the ATM protocol in
23 order to have an ATM network of devices.
24   Q Okay. Looking at the abstract, it says:
25   "Performance results from our   11:00:52

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20 (Pages 74 - 77)

1   implementation on a high-speed local
2   area ATM network are presented that
3   identify the effects of audio packet
4   size, buffering, and network latency
5   on the quality of multichannel program   11:01:05
6   material."
7   Do you see that?
8 A I do.
9 Q So is a high-speed local area ATM network a
10 network protocol or a data network?   11:01:16
11 A No. This is -- this sentence is kind of
12 conflating to me. It's a local area network running
13 the ATM protocol for purposes of this experiment.
14 Q Got it.
15 A So it requires different hardware. A TCP   11:01:32
16 local area network would require a different
17 hardware than an ATM protocol local network.
18 Sometimes they can be in the same box, but usually
19 it's different.
20 Q So your publication here is talking about a   11:01:48
21 local area network that uses the ATM protocol; is
22 that correct?
23 A Right.
24 Q Did you design and implement the local area
25 network that uses this ATM network described in this   11:02:04

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1 publication?
2 A If you look in Figure 1 of the next page,
3 this is a similar simpler diagram than -- compared
4 to the one that we saw before with the RMI network.
5   So we designed this architecture or this set   11:02:28
6 of components that are all off-the-shelf audio
7 parts, and you can see the ATM adapter inside the
8 computer that allows you to put out onto the network
9 data that follows the ATM protocol. And then
10 there's the playback application on the top.   11:02:54
11   So, yeah, we designed this architecture, but
12 it consists of computers and switches and wires that
13 are off the shelf and software that we put inside it
14 to do what we -- to run this experiment.
15 Q And when you say that "we designed," are you   11:03:09
16 saying that you designed the network described in
17 Figure 1, for example?
18   MR. KAPLAN: Object to the form.
19   THE WITNESS: The way collaborative papers
20 work is this is a group, you know, we have group   11:03:31
21 meetings. We designed the experiment and then have
22 regular kind of intervals of meeting and discussing.
23   So if you're asking who designed each
24 individual part, it's hard to say because we had
25 joint code sessions where we all sat in front of the   11:03:53

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1 screens, do this, change that, let's try this
2 exercise. And so it's hard to break it up into an
3 individual.
4 BY MR. PAK:
5 Q Yeah, understood.   11:04:04
6   So how about maybe -- let's take a look at
7 the last page, PDF page 6, and there's an
8 acknowledgment section. It says:
9   "The authors would like to thank
10   Dr. Sherali Zeadally" --   11:04:18
11   I might be botching that name.
12 A No, that's all right.
13 Q So let me read it again.
14   "The authors would like to thank
15   Dr. Sherali Zeadally for his work in   11:04:30
16   its design and implementation of the
17   ATM network."
18   Do you see that?
19 A I do.
20 Q So Dr. Zeadally is the one who actually   11:04:39
21 designed and implemented the local area network that
22 uses the ATM network described in this publication,
23 correct?
24 A Well, so he was a collaborator on this. The
25 second author in the paper was a joint student, so   11:04:54

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1 he was -- Mr. Zhu was Dr. Zeadally's student.
2 Dr. Zeadally's lab was doing experiments with ATM
3 networks, and they had the infrastructure that we
4 were looking for in terms of switches and the right
5 cables and so on.   11:05:17
6   So I think this is kind of -- because he
7 wasn't part of this particular experiment, he is not
8 a co-author, but we used his lab where he had kind
9 of a tabletop network for us to experiment with
10 these protocols.   11:05:34
11 Q Okay. I want to take a look at PDF page 3.
12 And there's a header 3 that says, "Experimental
13 Results".
14 A Yes.
15 Q Could you read the first two sentences under   11:05:51
16 that header?
17 A Yes.
18   "In order to assess the effects
19   of packet size and buffer size on the
20   quality of the audio streams   11:06:01
21   transmitted through the network, as
22   well as on the delay introduced by the
23   system, we performed a series of
24   tests."
25   The next one as well?   11:06:13

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21 (Pages 78 - 81)

1   Q   You know, that's fine.
2   A   Okay.
3   Q   So this publication discloses a system
4   architecture in which data packets are transmitted
5   over a local area network that uses the ATM   11:06:25
6   protocol; is that correct?
7   A   Well, this publication was not intended to
8   disclose the architecture. It was more intended to
9   use the architecture to experiment with what needs
10 to be changed or fixed or, you know, what matters in 11:06:39
11 high-quality audio transmission over a network that
12 has the bandwidth and the architecture that could
13 enable it. We just didn't know what the right
14 architecture was for transmitting audio in terms of
15 the buffer size and packet sizes, and so on.   11:06:56
16   So it was more of an experimental paper that
17 uses a network architecture based on the ATM system
18 that was kind of local to us there so we could
19 change things in it.
20 Q   All right. So the publication describes a   11:07:09
21 local area network that uses the ATM protocol to
22 transmit data packets, right?
23   MR. KAPLAN: Object to form.
24   THE WITNESS: The publication describes an
25 experiment that was conducted on the system we just   11:07:24

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1   described.
2   BY MR. PAK:
3   Q   Can you send data over a local area network
4   using the ATM protocol in the form of data that is
5   not a data packet?   11:07:51
6   A   No. The ATM protocol is a packet-based
7   protocol.
8   Q   Okay. I want to introduce another exhibit
9   here, so just give me a minute.
10   Okay. I just introduced Exhibit 7. Let me   11:08:45
11 know when you see it.
12 A   I see it.
13   (Exhibit 7 was marked for identification
14 electronically and is attached hereto.)
15 BY MR. PAK: 11:08:51
16 Q   Do you recognize this document?
17 A   Yes.
18 Q   At a high level, what does this publication
19 describe?
20   MR. KAPLAN: Object to form.   11:08:58
21   THE WITNESS: I don't know if this was an
22 actual publication. This was more of an internal --
23 more kind of like a white paper. I don't remember
24 the origin of it. It could be part of a report that
25 was presented to the annual review by the National   11:09:14

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1   Science Foundation.
2   It's related to an experiment that we did
3   with the New World Symphony based in Miami. And it
4   was similar to the RMI experiment trying to --
5   trying to deliver high-quality performance that is   11:09:57
6   convincing you to feel like you're in the concert
7   hall with them, even though you are 3,000 to 4,000
8   miles away.
9   We actually demonstrated this live to an
10 audience of several hundred people. It was the   11:10:10
11 first time that it had ever been done at that scale.
12 BY MR. PAK:
13 Q   This publication talks about HYDRA. It's
14 abbreviation for high resolution live streaming.
15 What is HYDRA?   11:10:26
16 A   So HYDRA was -- Professor Zimmerman that you
17 see there at the top, his laboratory and his
18 research group was experimenting with using similar
19 things that we talked about before using the UDP
20 protocol with error correction to deliver   11:10:52
21 high-quality content and overcome the problems that
22 normally arise with traditional ways of doing that,
23 for example, TCP, which were not designed for
24 streaming media. They were designed for offline --
25 it's okay if you can wait a second before you get   11:11:13

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1   your e-mail, but you can't wait to get the next
2   audio packet, right? So that's what HYDRA is. It
3   was trying to do that.
4   Q   Okay. And I want to take a look at the
5   second section, the Statement of Project Goals. And 11:11:27
6   in the middle of that section, the publication says:
7   "This project focuses on the
8   design of a system that enables HD
9   quality video and multiple channels of
10   audio to be streamed across an   11:11:43
11   IP-based network with commodity
12   equipment."
13   Do you see that?
14 A   Sorry. The middle section -- I missed where
15 you pointed.   11:11:52
16 Q   Yeah. So in the middle of Section 2,
17 Statement of Project Goals --
18 A   Oh, yes. I see it.
19 Q   Okay. What is an IP-based network as
20 described in this publication?   11:12:06
21 A   It's an internet protocol based network,
22 which is kind of a very common type of protocol for
23 transmitting data over the internet.
24 Q   Okay. And the second page here, Section 4,
25 the second to last paragraph -- second sentence --   11:12:30

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22 (Pages 82 - 85)

1 second to last sentence in the first paragraph, it
2 says:
3   "The transmission subsystem uses
4   the Realtime Transport Protocol, RTP,
5   on top of the Universal Datagram   11:12:45
6   Protocol, UDP."
7   Do you see that?
8   A Yes.
9   Q So this publication is talking about an
10 IP-based network that uses UDP; is that right?   11:12:55
11   A That's right. Those are subsets of an
12 IP-type network, just as TCP is.
13   Q I want to take a look at the system
14 architecture shown on Figure 1 of that page.
15   A Yes.   11:13:14
16   Q Do you see the stream transmitter/receiver in
17 the figure?
18   A Yes.
19   Q What does the stream transmitter/receiver do?
20   A That's -- that's a piece of software that's   11:13:25
21 kind of like the core of the HYDRA system. It takes
22 in multiple channels of microphones in this example
23 of a live recording, multiple cameras, and kind of
24 packages them together to send over the network by
25 paying attention to things that we talked about   11:14:03

1 before, error correction and other things.
2   Q What is the form of data that is transmitted
3 or received over the IP-based network disclosed in
4 this system architecture?
5   A Well, it's what it says on the line above RTP   11:14:19
6 over UDP.
7   Q Right. So this system architecture is
8 designed to transmit or receive data packets, right?
9   A Well, it's using an existing network that is
10 based on data packets.   11:14:38
11   So we had to take the data that is coming in
12 in different forms, audio and video, and convert it
13 to match what the network expects, in this case,
14 data packets.
15   Q Okay. I want to introduce another exhibit   11:14:53
16 here. Just give me one minute.
17   Okay, I just uploaded a new exhibit and
18 marked it as Exhibit 8.
19   (Exhibit 8 was marked for identification
20   electronically and is attached hereto.)   11:15:27
21 BY MR. PAK:
22   Q Let me know when you see it.
23   A I see it.
24   Q Do you recognize this document?
25   A Yes.   11:15:39

1   Q This is another one of your publications,
2 correct?
3   A Yes.
4   Q What does this publication describe?
5   MR. KAPLAN: Object to form.   11:15:51
6   THE WITNESS: This is another one of the same
7 kind of sequence of experiments we've been
8 discussing, which is high fidelity picture and sound
9 transmitted in a synchronized way over the Internet2
10 in this case. This particular one was trying to   11:16:08
11 understand what happens when you have an interactive
12 section.
13   So it's one way to stream in one direction to
14 an audience far away. It's another way when you
15 need to have two-way communication. Because in this   11:16:27
16 example, we had two musicians and they are supposed
17 to play a piano piece together, each on their own
18 piano. And musicians require, of course, very
19 accurate timing between them in order to perform.
20   So by adjusting -- artificially adjusting the   11:16:44
21 delay between the two of them is what -- how they
22 would hear the other side. And we were looking for
23 what the limits are of human performance over
24 networks.
25 ////

1 BY MR. PAK:
2   Q I want to take a look at the first paragraph
3 on the right column of page 1. After the first
4 sentence, it says:
5   "Network latency is an
6   unavoidable fact of interaction
7   environments over the Internet."
8   Do you see that?
9   A Yes.
10   Q What is network latency?   11:17:22
11   A It's the amount of time it takes for
12 information that was sent from one side of the
13 network and how long it takes to be received at the
14 other side. It is not instantaneous and it depends
15 on distance usually. That's what we call latency.   11:17:39
16   Q Why is network latency an unavoidable fact of
17 the interaction environments over the internet?
18   A Because of the protocols that are in place
19 that have been created to ensure, for example, that
20 data isn't lost. Sometimes that takes longer to   11:18:04
21 make sure that it's all collected before it's
22 presented to the other side. That's one reason.
23   The other reason is every time you go -- it's
24 not a direct connection between two distant places.
25 You go through switches on the network. And so   11:18:22

1 switches also, as they pass the data through,
2 introduce delay in order again to avoid -- because
3 they're doing something to make sure not to lose
4 anything. So the connection of all these boxes
5 introduces some delay.   11:18:37
6   It's not that dissimilar from an analog
7 network over long distances. Audio doesn't travel
8 at the speed of light. The longer the cable is --
9 it has to be pretty long, but you see delays in
10 analog circuits as well.   11:18:53
11   Q When you say "switches" on a network, are you
12 talking about packetized -- packet-based network
13 switches?
14   A In this case we're talking about the
15 internet, so that is a packet-based system, yes.   11:19:06
16   Q Okay. And the bottom of PDF page 1 under
17 subsection "Low Latency Audio," it says:
18   "The challenges in transmitting
19   audio over the internet are packet
20   loss and fluctuations in transmission   11:19:24
21   time."
22   So, you know, is packet loss, you know,
23 inevitable in a system that communicates over the
24 internet?
25   MR. KAPLAN: Object to form.   11:19:42

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1   THE WITNESS: Inevitable? There are ways to
2 mitigate it, and trade-offs. So you could make it
3 not happen at all. If you were okay incurring more
4 latency, just wait longer for everything to arrive.
5 But that's the trade-off. So in a realtime system   11:19:59
6 where you don't have the luxury of waiting, they are
7 inevitable in that sense, yes.
8 BY MR. PAK:
9   Q Okay. But when we talk about devices that
10 communicate over the internet, we're talking about   11:20:20
11 devices that send or receive data in the form of
12 data packets, right?
13   A Well, in that diagram, the two end devices,
14 the one at Diagram 1 we were talking about, is
15 that -- I'm sorry. That was in the previous   11:20:38
16 example? Yes, it was. Let's see if it's here as
17 well.
18   The devices that connect to the internet,
19 let's say the computer that connects to the internet
20 on the sending side takes in analog data from the   11:20:53
21 real world, converts it first to digital, and then
22 it has to convert it to a form -- you know, if we're
23 doing this experiment over a different kind of
24 network, we'd have to convert to whatever that
25 network expected.   11:21:11

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1   In this case, because this was an Internet2
2 experiment, we had to convert it to the UDP style --
3 the IP-type packet based form so that we could use
4 that network.
5   And then the opposite procedure happens at   11:21:23
6 the other end. We can't experience packets. We can
7 experience picture and sound. So we have to convert
8 it back.
9   Q So once data is converted from analog to
10 digital and sent over the internet, that data has to   11:21:35
11 take the form of packets; is that right?
12   A If we're going to use an internet -- existing
13 internet infrastructure, yes.
14   Q Okay. I want to take a look at Figure 1
15 shown on PDF page 2.   11:22:02
16   A Okay.
17   Q And the top of Figure 1 says:
18   "Data sources produce packetized
19   realtime data streams."
20   Do you see that?   11:22:16
21   A Yes.
22   Q What are the data sources in Figure 1?
23   A All kinds of multimedia capturing devices.
24 Camera, microphones -- cameras, microphones, in this
25 case haptic sensors.   11:22:38

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1   Q So data from these data sources are
2 first converted to digital form, right, and then
3 sent in packets over the internet; is that correct?
4   MR. KAPLAN: Object to form.
5   THE WITNESS: Yes. Yes. That's what those   11:23:08
6 little rectangles are trying to indicate, that data
7 has been packetized in realtime using RTP, as it
8 says there.
9 BY MR. PAK:
10   Q Okay. You know, I'm going to start   11:23:26
11 transitioning over to discussing your declaration.
12 So why don't we take a ten-minute break.
13   Is that okay?
14   A Sure.
15   THE VIDEOGRAPHER: Off the record at   11:23:34
16 11:23 a.m.
17   (Recess.)
18   THE VIDEOGRAPHER: We are on the record at
19 11:36 a.m.
20 BY MR. PAK: 11:36:18
21   Q Dr. K., you submitted a declaration on
22 June 1, 2021, for this matter between Sonos and
23 Google, correct?
24   A Correct.
25   Q You were retained as an expert to offer   11:36:35

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24 (Pages 90 - 93)

1 opinions on claim construction related to the
2 asserted patents in this case, right?
3   A Yes.
4   Q When were you contacted to offer your
5 opinions for claim construction related to the   11:36:46
6 asserted patents?
7   MR. KAPLAN: Object to form.
8   THE WITNESS: Specific to claim construction,
9 the discussions probably started a month ago, I'm
10 guessing.   11:37:01
11 BY MR. PAK:
12   Q So you were -- were you first contacted to
13 offer opinions on claim construction in May; is that
14 correct?
15   MR. KAPLAN: Object to form.   11:37:13
16   THE WITNESS: Again, I don't have the dates
17 in my head. It was after I was retained for the
18 case, obviously, but sounds about right. It could
19 have been in April.
20 BY MR. PAK: 11:37:26
21   Q Okay. Were you informed of what each party's
22 construction was at the time?
23   A At the time -- I was eventually, but not at
24 the time, no.
25   Q What did you do to prepare for your   11:37:45

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1 observation purposes.
2 BY MR. PAK:
3   Q Did you consider any other material to
4 prepare your declaration?
5   A Other than what I mentioned, no.   11:39:51
6   Q All right. I'd like to introduce your
7 declaration here now as Exhibit 9. I marked it as
8 Exhibit 9 and uploaded it. So just let me know when
9 you see it.
10   A I see it. I just wanted to ask you a   11:40:36
11 question. I have a clean copy of the -- from the 28
12 pages of the part that I wrote on my desk.
13 Sometimes it's easier to go to a page that way than
14 it is -- if that's okay with you, I have it right
15 here. It's not marked. It's just a clean printout. 11:40:49
16   (Exhibit 9 was marked for identification
17   electronically and is attached hereto.)
18 BY MR. PAK:
19   Q Yeah, that's okay.
20   Can you look at the last page of your   11:40:53
21 declaration or PDF page 28 of Exhibit 9.
22   A Yes.
23   Q Is that your signature?
24   A It's my electronic signature, yes.
25   Q I forgot to ask you, is this a true and   11:41:17

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1 declaration?
2   A I read the patents. I read through the
3 patent office -- office actions. Some of the prior
4 art. That's basically it. And then used knowledge,
5 my experience in the field to help form my opinions. 11:38:12
6   Q Did you consider the cited references in
7 the -- did you consider the cited references in the
8 office actions?
9   A Oh, the office actions.
10   I'm trying to remember. I read through a lot 11:38:36
11 of documents. I don't know if that -- for sure. I
12 tried to be as complete as possible. I don't know
13 if I did or not. Probably.
14   Q Do you understand that Sonos's experts,
15 Dr. Almeroth and Dr. Schmidt, submitted declarations 11:38:59
16 on claim construction in this case?
17   A Yes.
18   Q Did you read Dr. Almeroth's declaration?
19   A I did.
20   Q Did you read Dr. Schmidt's declaration?   11:39:14
21   A I believe I did.
22   MR. PAK: And, you know, just for the record,
23 I just noted Dr. Schmidt is actually on this Zoom
24 call. So I just wanted to point that out. I think
25 he joined a little bit late, but he is just here for 11:39:37

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1 correct -- true and accurate copy of your
2 declaration submitted June 1, 2021?
3   A Yes, it is.
4   Q Okay. And the opinions set forth in this
5 declaration are yours, correct?   11:41:32
6   A Yes.
7   Q To date, this is the only declaration that
8 you submitted in this case, correct?
9   A That's right.
10   Q Your declaration is as accurate and complete 11:41:42
11 as you could reasonably make it, correct?
12   A Yes. There's a minor copy and paste problem
13 that happened that I saw last night, but other than
14 that, yes.
15   Q Okay. And where is that copy and paste   11:42:02
16 error?
17   A It's on page 13. Claim terms. Part A is
18 zone configuration and part B should be just group
19 configuration. But initially I had them both
20 together in one table and then I split it up. So B   11:42:26
21 should be just group. That's it.
22   Q Is that the only error you see in your
23 declaration?
24   A That's all I saw, yes.
25   Q So let's walk through your declaration.   11:42:42

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25 (Pages 94 - 97)

1   Section 2, paragraphs 8 through 13, sets
2 forth your qualification as an expert, correct?
3   A Yes.
4   Q And Section 3, paragraphs 14 to 22, sets
5 forth your understanding of various legal standards   11:43:00
6 related to claim construction; is that fair?
7   A That's correct.
8   Q In reaching your opinions set forth in your
9 declaration, did you apply the legal standards set
10 forth in Section 3?   11:43:16
11   A Yes. To the best of my ability, I did.
12   Q Okay. Section 4, paragraphs 23 to 29, sets
13 forth your overview of the asserted patents,
14 correct?
15   A Yes.   11:43:30
16   Q Subsection A -- in subsection A, you provide
17 an overview of what you call the direct play
18 patents, correct?
19   A Yes.
20   Q According to subsection A, the direct play   11:43:50
21 patents share a common specification, correct?
22   A Yes.
23   Q At subsection B you provide an overview of
24 what you call the zone scene patents, correct?
25   A Right.   11:44:14

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1 this matter, correct?
2   A Right.
3   Q Section 7, paragraphs 37 all the way through
4 the end to paragraph 76, sets forth your analysis
5 regarding some of the parties' disputed claim   11:45:48
6 construction terms in this matter, correct?
7   A Yes.
8   Q And specifically paragraphs 37 to 48 provide
9 your analysis regarding the terms "zone
10 configuration" and "group configuration," correct?   11:46:02
11   A Correct.
12   Q Paragraphs 39 through 53 provide your
13 analysis regarding the term "local area network,"
14 correct?
15   A 39?   11:46:18
16   Q Go ahead. Sorry. Let me repeat that.
17   Paragraphs 49 through 53 provide your
18 analysis regarding the term "local area network,"
19 correct?
20   A Yes.   11:46:38
21   Q And paragraphs 54 to 59 provide your analysis
22 regarding the term of "media particular playback
23 system," correct?
24   A Yes.
25   Q Paragraph 60 to 73 provide your analysis   11:46:59

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1   Q According to this section, the zone scene
2 patents include the '206, '966, and '855 patents,
3 correct?
4   A Yes. I just want to point out these names
5 were provided to me and I believe they were -- these   11:44:31
6 are the Sonos designations. I'm not a hundred
7 percent that's -- the groupings of the patents were
8 provided this way.
9   Q When I -- if I refer to certain patents as
10 direct play patents or zone scene patents, you   11:44:46
11 understand what I mean by those terms?
12   A Yes.
13   Q Okay.
14   A I do.
15   Q According to subsection B, the '206 patent   11:44:52
16 specification is substantially the same as the '966
17 and the '855 patent specifications, correct?
18   A Yes.
19   Q Okay. Moving on to section 5, paragraphs 30
20 to 34, those paragraphs set forth your opinions   11:45:14
21 regarding the level of ordinary skill in the art,
22 correct?
23   A Correct.
24   Q Then Section 6, paragraphs 35 and 36, sets
25 forth your understanding of the asserted claims in   11:45:28

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1 regarding the term "data network," correct?
2   A Correct.
3   Q And, lastly, paragraphs 74 to 76 provide your
4 analysis regarding the term "wherein the instruction
5 comprises the instruction," correct?   11:47:18
6   A Right.
7   Q So we just walked through your declaration
8 here. Do you have any other changes besides that
9 copy and paste error that you would like to make to
10 your declaration?   11:47:33
11   A No.
12   Q So how about we jump to paragraph 24. It's
13 on page 9 of your declaration.
14   A Okay.
15   Q Okay. Paragraph 4 -- paragraph 24 says: 11:47:54
16   "Each of the zone scene patents
17   originated with U.S. provisional
18   application number 60/825,407, which
19   was filed on September 12, 2006."
20   Do you see that?   11:48:14
21   A Yes.
22   Q Now, let's take a look at paragraph 28 on the
23 next page.
24   A I see it.
25   Q Actually, if you go to the bottom of page 11,   11:48:33

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26 (Pages 98 - 101)

1 it says:

2   "In my experience, at the time

3   the Zone Scene patents were filed,

4   multi-zone audio systems existed from

5   a variety of manufactures, such as   11:48:45

6   Bose, Crestron, and others."

7   Do you see that?

8   A   Yes.

9   Q   Do you know any specific conventional

10 multi-zone audio systems that existed at the time   11:48:58

11 the zone scene patents were filed?

12   A   Are you saying other than the ones I listed

13 here?

14   Q   Well, you've listed manufacturers, right?

15 But do you know any actual product names or model   11:49:11

16 numbers?

17   A   Oh, product names. Let's see if I can recall

18 any.

19   The Bose one I think was called a Lifestyle.

20 I'd have to look it up.   11:49:28

21   Crestron -- Crestron makes hardware and

22 software for multi-room installations, whether it's

23 board rooms or homes. I don't know if they have a

24 specific product name. But normally there's others.

25 A lot of the home theater receiver manufacturers,   11:49:55

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1 such as Denon -- I know that one because that was

2 the first product that Audyssey went into when we

3 first started. It was the AVR5805, and many others

4 after that. They all provide connectors and

5 mechanism to have multiple zones of audio in your   11:50:19

6 home.

7   Initially there was two and eventually more

8 than two, perhaps three or four. Yamaha, Marantz,

9 Onkyo, many of those had those.

10   Q   Have you ever used a Bose Lifestyle system?   11:50:40

11   A   I have, yes.

12   Q   Do you know -- do you know which Bose

13 Lifestyle system you used?

14   A   It's been so many years, so I don't remember

15 the model number.   11:51:08

16   Q   Does the Bose Lifestyle 50, does that ring a

17 bell?

18   A   Possibly, but I don't remember.

19   Again, this was one of the situations where

20 we brought it into the testing lab at Audyssey just   11:51:25

21 to look at things. So paid less attention to the

22 model number than what it could do.

23   Q   Do you recall how the Bose Lifestyle system

24 operates?

25   A   At a high level, sure, yes.   11:51:41

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1   Q   Could you please describe how the Bose

2 Lifestyle system operates?

3   A   It has the main -- I guess I would call it a

4 processing box where you connect your audio sources.

5 So it acts as a source selector. That box provides   11:52:03

6 outputs that go to amplifiers in it as well and

7 provides outputs that interconnect the loudspeakers.

8 In that case I believe it was a 5.1 surround system.

9 And it has an additional -- I don't know what they

10 call it -- breakout box that allows you to extend to   11:52:22

11 a different room and still be controlled by the main

12 controller. And also it had a remote control.

13   Q   How do the loudspeakers interconnecting to

14 that central box communicate with the controller,

15 the remote controller?   11:52:51

16   A   The remote controller sends signals over a

17 wireless link to the main box, I guess main

18 processor. And then it tells, you know, what each

19 speaker should be playing over the wired

20 connections.   11:53:18

21   Q   Do the loudspeakers connected to the central

22 box communicate with one another?

23   A   With one another? No. The central processor

24 decides what to send to each one.

25   Q   In the Bose Lifestyle system can you   11:53:40

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1 synchronize the loudspeakers to play audio in

2 synchrony?

3   A   Yes.

4   Q   How does the Bose Lifestyle accomplish that?

5   A   That's a Bose method inside their own   11:54:05

6 processor. Let's just say it wouldn't be a very

7 successful product if they played out of synchrony.

8 It would be a terrible audio system.

9   Q   Right. But the loudspeakers don't

10 communicate with each other, right? So how do they   11:54:25

11 coordinate with one another to play audio in

12 synchrony?

13   A   Because the central processor that is

14 deciding what to send, what signal stream to send to

15 each one makes sure that they are transmitted over   11:54:38

16 each connection in the required synchrony.

17   Q   When you say "the central processor," you're

18 talking about the central device that interconnects

19 the loudspeakers, correct?

20   A   Right. That has a processor in it and it's   11:54:58

21 responsible for a number of things, simple things

22 like adjusting volume in response to commands that

23 it receives. Perhaps decoding audio formats from

24 the sources that are coming in. And then

25 distributing the audio over the interconnect.   11:55:16

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27 (Pages 102 - 105)

1   Q So the loudspeakers communicate with the
2 central processor, right, but they don't communicate
3 with one another directly, correct?
4   MR. KAPLAN: Object to form.
5   THE WITNESS: The loudspeakers receive data   11:55:35
6 from the central processor, but they don't
7 communicate with each other.
8 BY MR. PAK:
9   Q Okay. So what -- what cables are required to
10 interconnect the loud speakers to the central box or   11:55:57
11 the central processor of the Bose Lifestyle system?
12   A These are provided by Bose. They are copper
13 cables and they have RCA-type connections at the end
14 of each side of the cable.
15   Q Do you know if the Bose Lifestyle system can   11:56:31
16 communicate over Wi-Fi?
17   A I'm sure they have models that can. That
18 particular one I don't think did.
19   Q So the loudspeakers are internet connected to
20 the central processor or central box, right? What   11:56:59
21 is the form of data that is transmitted between the
22 loud speaker and the central processor?
23   MR. KAPLAN: Object to form.
24   THE WITNESS: It's analog audio data.
25 ////

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1 communicate over a local area network?
2   A Based on what I said this morning, that is a
3 local area network. It's analog data going to --
4 being carried over copper wires to end devices.
5   Q Okay. And this Bose Lifestyle system was   11:59:06
6 unable to -- incapable of communicating over the
7 internet; is that right?
8   MR. KAPLAN: Object to form.
9   THE WITNESS: Because I don't remember the
10 model, I'm not sure if this -- if you could stream   11:59:35
11 to it. It could connect to a number of sources. I
12 just don't recall if one of them could be a wireless
13 source.
14 BY MR. PAK:
15   Q Do you know when you used this Bose Lifestyle   11:59:52
16 system?
17   A Probably seven or eight years ago.
18   Q So sometime in 2013, 2012 you used this Bose
19 Lifestyle system?
20   MR. KAPLAN: Object to form.   12:00:13
21   THE WITNESS: To the best of my recollection.
22 BY MR. PAK:
23   Q Do you know when this Bose Lifestyle system
24 was released?
25   MR. KAPLAN: Object to form.   12:00:23

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1 BY MR. PAK:
2   Q Does it have to be analog audio data?
3   MR. KAPLAN: Object to form.
4   THE WITNESS: In general or in that product?
5 BY MR. PAK:
6   Q In that product. In that product when a
7 loudspeaker communicates to the central processor or
8 the central box, does it send analog data or digital
9 data?
10   A It sends analog data because the amplifiers   11:57:42
11 are inside that same box where the processor is. So
12 the output of the amplifier is using analog audio
13 signals sent to each speaker.
14   Q So in that product, in that Bose Lifestyle
15 system, the loudspeakers are not sending data   11:57:59
16 packets to that central processor, correct?
17   MR. KAPLAN: Object to form.
18 BY MR. PAK:
19   Q Sorry. Did you say "correct"?
20   A Yes, correct.   11:58:17
21   Q Okay. Do you know if the Bose Lifestyle
22 system communicated over a local area network?
23   A Communicated with what?
24   Q Do you know if the loudspeakers
25 interconnected to the central processor could   11:58:38

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1   THE WITNESS: I know that their Lifestyle
2 series was released well before that. I just -- and
3 they have more than one model. So that was probably
4 current at the time when we looked at it, but I
5 don't know.   12:00:42
6 BY MR. PAK:
7   Q But this is the model of Bose Lifestyle
8 system that included a remote control, you said; is
9 that right?
10   A Yes.   12:00:50
11   Q Could you describe what this remote control
12 did in the Bose Lifestyle system?
13   A The obvious things. Selecting the source --
14 again, this is a bit of a long time ago, but I think
15 it was change the volume and select the room. I   12:01:14
16 think they call it multi-room in the manual or in
17 the Bose language. So select which room you want
18 the music to play in or if it was all rooms.
19   That's my basic recollection. There might
20 have been other things too, but I just don't   12:01:42
21 remember.
22   Q Do you know what the Bose Lifestyle system
23 remote control looked like? Like what shape it
24 might have been in?
25   MR. KAPLAN: Object to form.   12:02:01

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28 (Pages 106 - 109)

1   THE WITNESS: It had a screen -- it had a
2 screen in front of it. It might have been
3 rectangular or oval. I'm stretching my memory.
4 BY MR. PAK:
5   Q I understand. I know it's 17 years ago. I   12:02:21
6 was just curious.
7   I want to move to paragraph 31 of your
8 declaration. It's talking about the level of
9 ordinary skill in the art. Could you please read
10 paragraph 31 of your declaration.   12:02:32
11   A Yes.
12   "In my opinion, a person of
13   ordinary skill in the art at this time
14   would have had a bachelor's of science
15   in electrical engineering, computer   12:02:42
16   science or engineering, or a related
17   field, and two to four years of work
18   or research experience in the field of
19   information networks, data
20   communications or multimedia systems,   12:02:52
21   or a master's degree and one to two
22   years of experience in the same
23   field."
24   Q Does that mean a person of ordinary skill in
25 the art can be someone with a master's degree in any   12:03:02

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1 field and one to two years of experience in the
2 fields of information networks, data communications,
3 or multimedia systems?
4   A No. What I meant is a master's degree in the
5 areas that I listed for the bachelor's.   12:03:19
6   Q Okay. So what you -- what you meant was a
7 master's degree in electrical engineering, computer
8 science, or engineering, and one to two years of
9 experience in the fields of information networks,
10 data communications, or multimedia systems; is that   12:03:34
11 right?
12   A Correct.
13   Q Okay. So as it is written right now in
14 paragraph 31, the way it's written is incorrect,
15 right?   12:03:47
16   MR. KAPLAN: Object to form.
17   THE WITNESS: Well, I don't know if it's
18 incorrect. I mean, I didn't want to repeat. I know
19 that's probably customary in legal documents, but I
20 thought it was obvious that it was referring to for   12:04:02
21 bachelor's, you get your master's in the same
22 fields.
23 BY MR. PAK:
24   Q And what are information networks?
25   A We've talked about all kinds of examples   12:04:14

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1 today, but basically data networks. It's -- I guess
2 in -- at least at USC, I think the -- it's an area
3 that is studied called information networks. So I
4 think it's just different terminology for data
5 networks.   12:04:42
6   Q Are you using the term "information networks"
7 to be synonymous with "data networks"?
8   A In this paragraph, yes.
9   Q So an information network is any type of
10 media that carries data, right?   12:05:00
11   A Well, I don't know if it's -- like if you go
12 to a network engineer and ask them what an
13 information network is, that's the answer you would
14 get. This is more of an academic field that I was
15 referring to just because I know there are courses   12:05:17
16 listed that way.
17   So I don't know if it's a physical thing. I
18 was just referring to it as a field of study.
19   Q What does the field of data communications
20 include?   12:05:33
21   A Protocols for communication for exchanging
22 data. Error correction, anything to do with
23 handling of data, analog or digital.
24   Q What are multimedia systems?
25   A Multimedia systems are generally considered   12:06:01

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1 processing systems with processing that can handle
2 multiple types of media, such as pictures, video,
3 audio, voice, text, haptics, all the ones that we
4 talked about earlier.
5   Q What about an audio system that only renders   12:06:38
6 audio, is that a multimedia system?
7   A An audio system that can't handle anything
8 else?
9   Q Yes.
10   A No. I would say no. Multi in multimedia   12:06:53
11 requires more than one.
12   Q So if a person has a -- sorry, I didn't mean
13 to cut you off.
14   A I'm fine. I'm done.
15   Q If a person has a bachelor's of science in   12:07:06
16 electrical engineering and only has experience in
17 audio systems that only render audio, but not any
18 other type of media, then that person would not
19 qualify as a person of ordinary skill in the art,
20 correct?
21   A No, I don't agree. I think if somebody has
22 studied multimedia systems as part of their field of
23 study, they have also studied audio and other
24 things. So if you have taken courses in multimedia
25 systems, you certainly have taken courses in just   12:07:49

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29 (Pages 110 - 113)

1 audio, similar to the ones that I teach, or just
2 speech like my colleagues teach, or just video, and
3 also the integration of them. So it comes with
4 everything.
5   Q You know Sonos is a speaker company, right?   12:08:00
6   A Yes.
7   MR. KAPLAN: Object to form.
8 BY MR. PAK:
9   Q So if a person who works at Sonos has a
10 bachelor's of science in electrical engineering and   12:08:14
11 has experience in working on speaker systems that
12 render audio but don't render video or any other
13 type of media, does that person still qualify as a
14 person of ordinary skill in the art?
15   A That's kind of a hypothetical question. I'd   12:08:39
16 have to meet that person and find out what their
17 experience was to really answer that. I don't know
18 what courses they took or what experience they had
19 prior to Sonos.
20   Q What I'm trying to get at here is the word   12:08:47
21 "multimedia systems." You know, it seems like in
22 order to have experience in multimedia systems,
23 right, you need to -- you need a person that studied
24 a systems that render multiple types of media,
25 according to your definition, right?   12:09:16

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1   A Right. But not just renders. All aspects --
2 multimedia systems represent systems that deal with
3 the integration, whether it's on the capture side,
4 compression, streaming of these integrated media
5 types.   12:09:47
6   But in order to study that, you do have to
7 study each individual one as well. This is not
8 just -- all components have to be studied
9 individually as well. And I assume somebody with
10 that kind of degree -- just based on the degrees we   12:10:00
11 have at USC, I can say that that's for sure the
12 case.
13   Q What are -- what are some examples of
14 multimedia?
15   MR. KAPLAN: Object to form.   12:10:15
16 BY MR. PAK:
17   Q Or let me phrase it differently.
18   What types of media -- what are some examples
19 of media types that would be categorized as
20 multimedia?   12:10:28
21   A Okay. So we're talking about media, not
22 systems, right?
23   Q Yes.
24   A You know, some obvious ones are television
25 programs, picture and sound, and graphics many   12:10:39

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1 times. Computer games. More boring ones like
2 PowerPoint presentations with audio or video
3 embedded in them. Anything that has more than two
4 media. Or two or more, I should say.
5   Q Is a multimedia system that can render two or   12:11:11
6 more types of media other than audio, would that
7 qualify as a multimedia system?
8   A Sure.
9   Q So if a person has experience in implementing
10 and designing multimedia systems that don't render   12:11:38
11 audio but other types of media, is it your opinion
12 that that person would qualify as a person of
13 ordinary skill in the art?
14   A I'm sorry. Could you repeat that one more
15 time?   12:11:50
16   Q Yeah. So if a person has experience in
17 implementing or designing a multimedia system that
18 doesn't render audio but renders other types of
19 media, is it your opinion that that person would
20 qualify as a person of ordinary skill in the art?   12:12:04
21   A My assumption -- what I was trying to say
22 here was that this person has studied multimedia
23 systems. Whether they're designing now or not is
24 different. But if they studied multimedia systems,
25 then they certainly studied audio, voice, graphics   12:12:22

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1 and text and others, perhaps, depending on the
2 program. So they've certainly had experience.
3   Q Okay. So you're assuming that if a person
4 has experience in multimedia systems, that person
5 would have experience in other types of media,   12:12:43
6 whether that's video, audio, or images, that person
7 would have experience in all of those different
8 types of media, correct?
9   A Correct. I wouldn't call them "other." I
10 would call them components of multimedia.   12:12:56
11   Q Okay. Let's take a look at paragraph 62 of
12 your declaration.
13   A Yes.
14   Q Would you please read that paragraph for me,
15 just the first two sentences.   12:13:28
16   A
17   "Numerous technical dictionaries
18   confirm that data," in quotations,
19   "including audio data, can be
20   represented in both analog," in   12:13:37
21   quotes, "or digital," in quotes,
22   "form. Digital data is," quotes,
23   "data represented in discreet
24   discontinuous form, as contrasted with
25   analog data represented in continuous   12:13:47

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30 (Pages 114 - 117)

1   form," end quote.
2   Q   Okay. And then paragraph -- in paragraph 63,
3 the second sentence, it says:
4   "In the generic sense, packets
5   refer to the manner in which data are   12:14:04
6   organized into discreet units for
7   transmission and switching through a
8   data network."
9   Do you see that?
10   A   Yes.   12:14:12
11   Q   So data packets are in digital form, correct?
12   A   Data packets are, yes.
13   Q   Can data packets be in analog form?
14   A   Data can be in analog form, but it's not
15 transmitted using packets.   12:14:37
16   Q   Right. So data packets are not in analog
17 form, correct?
18   A   Correct.
19   Q   Are there other discreet discontinuous forms
20 of data that are not data packets?   12:14:53
21   A   Yes.
22   Q   What are those forms of data?
23   A   A digital audio stream that consists of bits,
24 those are not packets. It's continuous stream of
25 bits or a digital audio stream that we talked about   12:15:17

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1 before that has been modulated through some
2 pre-agreed encoding scheme like pulse code
3 modulation. Though those are not -- those are
4 digital streams that are not packets.
5   Q   In order to stream audio from the internet,   12:15:44
6 from an internet media source on a speaker, does
7 that streaming audio have to be in the form of
8 packets or can it be in a continuous form of data?
9   A   If we're talking about the general purpose
10 internet, you know, it only supports packet   12:16:32
11 protocols. So it would have to be put in that form.
12   Q   I'd like to introduce a new exhibit here. I
13 uploaded it and marked it as Exhibit 10.
14   (Exhibit 10 was marked for identification
15   electronically and is attached hereto.)   12:16:55
16 BY MR. PAK:
17   Q   Let me know when you see that.
18   A   I see it.
19   Q   Do you recognize this document?
20   A   Yes. It's the '206 patent.   12:17:06
21   Q   I want to take a look at Column 4. It's on
22 PDF page 16 and line 36. It says:
23   "As used herein, unless
24   explicitly stated otherwise, an audio
25   source or audio sources are in digital   12:17:32

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1   format and can be transported or
2   streamed over a data network."
3   Do you see that?
4   A   I do.
5   Q   The '206 patent discusses sending and   12:17:43
6 receiving audio in digital form, correct?
7   A   Yes.
8   MR. KAPLAN: Object to form.
9 BY MR. PAK:
10   Q   Is there anywhere in the '206 patent that   12:17:52
11 discusses sending and receiving audio data in the
12 form of -- let me -- let me rephrase that.
13   Is there anywhere in the '206 patent that
14 discusses sending and receiving audio in analog
15 form?   12:18:08
16   A   That wasn't -- I'd have to go look at it
17 again. I don't remember every word of the patent.
18 The sections that I looked at for my opinion were --
19 you know, I just looked for those things. So I
20 would have to go look and make sure of the answer.   12:18:26
21   Q   Sitting here today, you can't recall any
22 passages in the '206 patent that discusses sending
23 and receiving audio data in analog form, correct?
24   MR. KAPLAN: Object to form.
25 Mischaracterizes testimony.   12:18:43

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1   THE WITNESS: Like I said, I don't want to
2 say I do or I don't because I don't -- I'd have to
3 go read it. It's possible.
4   For example, I know that at Sonos there are
5 Sonos audio products that have analog inputs on the   12:18:55
6 back. And so I just don't know if -- I just don't
7 know if there is a section in this patent since I
8 haven't looked for that specifically.
9 BY MR. PAK:
10   Q   Would it help if we take a few minutes for   12:19:17
11 you to review the patent and see if you can find any
12 passages that discuss sending and receiving audio in
13 the form of analog data?
14   A   Sure.
15   Q   Okay. So how about we do that, take a few   12:19:29
16 minutes.
17   A   Okay.
18   THE REPORTER: Do you want to go off the
19 record or not?
20   MR. KAPLAN: No.   12:19:46
21   THE WITNESS: By doing a quick search, I
22 could find -- I could keep looking -- Column 4, line
23 65:
24   "The device 112 is configured to
25   receive an analog audio source, e.g.,   12:20:23

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31 (Pages 118 - 121)

1   for broadcasting."
2   The audio sources -- Column 5 -- I'm just
3 reading from line 65 onward. The last line there
4 says:
5   "The analog audio sources can be   12:20:45
6   converted to digital audio sources."
7 BY MR. PAK:
8   Q   Right. And then the next sentence says:
9   "In accordance with the present
10   invention, the audio source may be   12:20:58
11   shared among the devices on network
12   108."
13   Do you see that?
14   A   I do.
15   Q   So let's go back to paragraph 4 -- column 4,   12:21:07
16 line 50. Could you please read that paragraph for
17 me.
18   A
19   "The network 108 may be a wired
20   network, a wireless network, or a   12:21:22
21   combination of both."
22   Q   You can keep going.
23   A
24   "In one example, all devices,
25   including the zone players 102, 104,   12:21:32

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1   and 106, are coupled to the network by
2   wireless means, based on an industry
3   standard such as IEEE 802.11.
4   "Another example --
5   Q   You can stop there.   12:21:47
6   As the patent describes, network 108 is
7 talking about an internet-based network that uses
8 industry standards such as the IEEE 802.11 standard,
9 correct?
10   MR. KAPLAN: Objection. Mischaracterizes the   12:22:04
11 document.
12   THE WITNESS: I don't -- I wouldn't call this
13 internet based. This just tells me how the
14 components are communicating, which is a wireless --
15 standard 802.11 wireless.   12:22:19
16 BY MR. PAK:
17   Q   And the 802.11 standard requires data to be
18 transmitted or received in digital format, correct?
19   A   Correct.
20   Q   And that data transmitted over 802.11   12:22:33
21 standard requires data to be transmitted and
22 received in the form of data packets, correct?
23   A   Correct.
24   Referring back to your analog question, I'm
25 just seeing more sections here. Column 6, line 3   12:22:59

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1 and 10. Without reading them directly, it talks
2 about the ability to handle analog signals, whether
3 it's processing them from inputs and then converting
4 them to digital to share with other devices on a
5 network. And then line 9 on the same column: 12:23:21
6   "The audio amplifier is typically
7   an analog circuit, but powers the
8   provided analog audio signals to drive
9   one or more speakers."
10   Q   So those sentences that you point out, you   12:23:43
11 know, on Column 6 of the patent talk about
12 processing analog signals, but when that signal is
13 actually sent or received over the network, it talks
14 about producing digital signals. So it's talking
15 about converting the analog signals to digital   12:23:56
16 signals to communicate over the network, correct?
17   A   Yes.
18   MR. KAPLAN: Object to form.
19   THE WITNESS: Yes. I was just responding to
20 your question as to whether there is any mention of   12:24:06
21 analog in this. Clearly the patent talks about
22 products that could handle connections to analog
23 input signals.
24 BY MR. PAK:
25   Q   Right. But does this patent talk about   12:24:17

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1 sending analog data over the network, such as
2 network 108 described in the patent?
3   A   I think it does indirectly. Because in line
4 50 that you read before, the network may be a wired
5 network. It doesn't say that that needs to be   12:24:47
6 digital. It could be analog.
7   Q   Well, you know, let's go back to Column 4,
8 line 36. It says:
9   "As used herein, unless
10   explicitly stated otherwise, when an   12:25:03
11   audio source or audio sources are in
12   digital format, they can be
13   transported or streamed over a data
14   network."
15   Right? So in line -- line 50 when it says   12:25:14
16 "The network 108 may be a wired network or a
17 wireless network, or a combination of both," it's
18 talking about sending data in digital format, right?
19 Unless it's stated otherwise, you have to assume
20 that you're sending or receiving data in digital   12:25:30
21 format, correct?
22   MR. KAPLAN: Objection. Mischaracterizes the
23 document.
24   THE WITNESS: I don't know. It's hard --
25 it's like the paragraph here, maybe. I'm not   12:25:45

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32 (Pages 122 - 125)

1 certain about that.
2 BY MR. PAK:
3   Q   Sure. Let me ask you this way.
4   So in line 50 in Column 4, it says:
5   "The network 108 may be a wired   12:25:55
6   network or a wireless network or a
7   combination of both."
8   Right?
9   A   Yes.
10   Q   Does that sentence mention analog?   12:26:02
11   A   No.
12   Q   Okay. Let's take a look at paragraph 64 of
13 your declaration. So back to Exhibit 9. It's PDF
14 page -- PDF page 23.
15   And in the middle of that paragraph, it says: 12:26:43
16   "These networks allowed cellular
17   devices to send and receive data, as
18   Sonos requires, typically in the form
19   of voice calls."
20   Do you see that?   12:26:56
21   A   Yes.
22   MR. KAPLAN: I'm sorry. Which paragraph
23 again?
24   MR. PAK: Paragraph 64.
25   MR. KAPLAN: Thank you.   12:27:08

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1 switch telephone network and send audio data to
2 render that audio data on one of those speakers?
3   A   Oh, yeah, absolutely. Speaker phones, right?
4   Q   Do the patents disclose speaker phones?
5   A   I was just giving you an example of what you   12:29:08
6 could connect. You can connect any kind of
7 transducer because what you're getting out is an
8 audio signal. So if you send it to a loudspeaker,
9 it will play, and the loudspeaker can be any kind of
10 form.   12:29:29
11   Q   Does the '206 patent discuss sending or
12 receiving data over a public switch telephone
13 network?
14   A   Well, as I say, it talks about sending and
15 receiving it over networks in general and it doesn't   12:29:42
16 exclude that, but it doesn't mention it specifically
17 either.
18   Q   Is a speaker phone capable of processing and
19 rendering audio data?
20   A   Yes.   12:30:03
21   Q   Does the '206 patent discuss sending or
22 receiving audio data via RCA cables?
23   A   The discussion we had before about connecting
24 analog sources, and I do know that some of the Sonos
25 speakers have that in the back, but that connection   12:30:30

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1   THE WITNESS: I see it.
2 BY MR. PAK:
3   Q   Does the '206 patent discuss sending or
4 receiving audio data over a cellular or voice
5 network?   12:27:19
6   A   Well, it discusses sending or receiving it
7 over wireless networks. So that would cover all
8 kinds of wireless networks in the broadest sense,
9 right? It doesn't exclude them.
10   Q   Can you send data over a voice network to   12:27:41
11 render audio on a device?
12   A   So because you don't have construction of
13 what a voice network is, claim construction around
14 voice network, I want to know what your definition
15 is of voice network so I can answer correctly.   12:28:14
16   Q   Right. So earlier you said a voice network
17 would be -- like an example would be a telephony
18 network, like a public switch telephone network,
19 correct?
20   A   Correct.   12:28:28
21   Q   And you wouldn't send or receive audio data
22 over a public switch telephone network, would you?
23   A   Why not? Voice is audio data basically,
24 right? So you kind of are doing that.
25   Q   Can you have speakers connected to a public   12:28:44

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1 would typically be an RCA cable. It might also be a
2 mini jack, a 1/8th inch jack or cable.
3   Q   Okay. So let's look at the patent, Column 1,
4 line 40. Would you please read that first sentence
5 for me.   12:31:15
6   A
7   "Currently one of the systems
8   that can meet part of such demand is a
9   conventional multizone audio system
10   that usually includes a number of   12:31:21
11   audio players."
12   Q   Keep going.
13   A
14   "Each of the audio players has
15   its own amplifiers and a set of   12:31:28
16   speakers and typically installed in
17   one place, e.g., the room. In order
18   to play an audio source at one
19   location, the audio source must be
20   provided locally or from a centralized   12:31:41
21   location."
22   Keep going?
23   Q   No, that's okay.
24   Is there anything in this patent that
25 distinguishes those type of conventional multi-audio   12:32:07

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33 (Pages 126 - 129)

1 systems to what is disclosed in the patent as the
2 invention?
3   MR. KAPLAN: Objection to form.
4 BY MR. PAK:
5   Q Let me put it this way. The next paragraph,   12:32:34
6 can you read the first sentence of that -- of line
7 56.
8   A
9   "In order to achieve playing
10   different audio sources in different   12:32:44
11   audio players, the traditional
12   multizone audio system is generally
13   either hard wired or controlled by a
14   preconfigured and preprogrammed
15   controller."   12:32:55
16   Q Right. So the patent talks about traditional
17 multizone audio systems being either hardwired or
18 controlled by a preconfigured or preprogrammed
19 controller, and it distinguishes those traditional
20 multizone audio systems from the -- from the system   12:33:13
21 disclosed in the '206 patent as the invention,
22 right?
23   MR. KAPLAN: Object to the form.
24   THE WITNESS: I mean, that's kind of the
25 purpose of writing the background. What you're   12:33:49

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1 going to say after that is supposed to be better.
2 BY MR. PAK:
3   Q Right. So the disclosed system in the '206
4 patent that's described as the invention isn't
5 talking about these hardwired traditional multi-zone   12:34:07
6 audio systems, right?
7   MR. KAPLAN: Object to form.
8   THE WITNESS: Well, it doesn't completely go
9 away from it because it allows for a wired source,
10 an analog wired source to be connected to one of the   12:34:31
11 zone players and then be distributed. So it doesn't
12 completely remove them.
13 BY MR. PAK:
14   Q Does the patent discuss what the wired source
15 has to be, what form it has to be in?   12:34:49
16   MR. KAPLAN: Object to form.
17   THE WITNESS: It gives examples at the bottom
18 of Column 4, line 66, broadcasting, which is analog,
19 compact disk, which could be digital or analog,
20 depending on what connection you have. Yeah, those   12:35:20
21 are examples.
22 BY MR. PAK:
23   Q All right. So let's take a look at Column 5.
24 And I'm looking at line 33. It says:
25   "The wired interface 217 provides   12:35:39

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1   network interface functions by a wired
2   means, for example, an Ethernet
3   cable."
4   Do you see that?
5   A Yes.   12:35:46
6   Q So the patent discloses that the wired
7 network can be an Ethernet cable, right?
8   A That's a different network than the one that
9 connects -- this is not for connecting sources.
10 This is for connecting speakers together to -- could   12:36:07
11 be wired or wireless. The previous discussion was
12 about what kind of sources.
13   Q Right. So this is talking about the wired
14 interface of a zone player, correct?
15   MR. KAPLAN: Object to form.   12:36:36
16   THE WITNESS: Yes. This is talking about how
17 to connect multiple zone players, in this case,
18 speakers, whether they're wired or wireless. They
19 provide capability for both.
20 BY MR. PAK: 12:36:54
21   Q So let's talk about the zone player. So the
22 zone player has network interface -- so a zone
23 player has a network interface 202, which may
24 include one or both of the wireless interface 216
25 and a wired interface 217, right?   12:37:17

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1   A Yes.
2   Q Okay. And specifically the wired interface
3 217 provides network interface function by wired
4 means, for example, an Ethernet cable, correct?
5   A Correct. And this is why I was talking about   12:37:39
6 the introduction before. It seems to contradict the
7 benefit because they say that the old systems were
8 all wired and so they're no good. But now they also
9 provide capability for wired. So it's just a
10 different type of wire, I suppose.   12:37:55
11   Q As you recall, did these traditional
12 multizone audio systems include speakers that were
13 connected via an Ethernet cable?
14   A No. That's what I'm saying. They were
15 connected by copper RCA cables or speaker cables   12:38:16
16 directly.
17   So this is a different kind of cable, but
18 still the possibility existed of speakers in
19 different zones or rooms that are connected by
20 wires. Just a different kind of wire.   12:38:31
21   Q What is the difference between an Ethernet
22 cable and a copper wire such as an RCA cable?
23   A I guess Ethernet cables are also made of
24 copper, but they have different kinds of endings and
25 they have multiple strands in them carrying data.   12:39:06

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34 (Pages 130 - 133)

1 So I guess I would consider an Ethernet cable
2 capable of carrying digital packet data, whereas an
3 audio interconnect carries analog audio data.
4   Q   So an RCA cable carries analog data, whereas
5 an Ethernet cable carries digital data packets,   12:39:38
6 correct?
7   A   To be totally clear, analog cables -- sorry,
8 RCA cables can also carry digital data. Just not
9 packetized.
10   Q   Okay, that makes sense.   12:39:54
11   I want to take a look at paragraph 66 of your
12 declaration.
13   A   Yes.
14   Q   Let me get to it real quick. The second
15 sentence of paragraph 66 says: 12:40:21
16   "There are many types of networks
17   that do not require a network device
18   to both send and receive data from
19   another device. For example, networks
20   may be configured in a ring such that   12:40:31
21   no device both sends and receives data
22   directly to and from another device."
23   Do you see that?
24   A   Yes.
25   Q   Okay. So let's take a look at Sonos's   12:40:43

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1 proposed construction on page 21 of your
2 declaration. Could you please read Sonos's
3 construction for data network.
4   A
5   "A medium that interconnects the   12:41:00
6   devices enabling them to send data
7   packets to" --
8   I'll start over.
9   "A medium that interconnects
10   devices, enabling them to send digital   12:41:09
11   data packets to and receive digital
12   data packets from each other."
13   Q   Does Sonos's proposed construction of data
14 network require sending and receiving data directly
15 to and from another device?   12:41:26
16   MR. KAPLAN: Object to form.
17   THE WITNESS: I guess I'm not sure what
18 "directly" means in this context. We're connecting
19 two devices.
20 BY MR. PAK: 12:41:45
21   Q   So let me ask you this way. Does the word
22 "directly" appear in Sonos's proposed construction?
23   A   It does not.
24   Q   Okay. So Sonos's construction of data
25 network does not require sending and receiving data   12:41:56

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1 directly to and from another device, correct?
2   MR. KAPLAN: Object to form.
3   THE WITNESS: I don't know how else to
4 interpret this. It says, "sending and receiving
5 from each other." So unless there is something in   12:42:10
6 between that is not disclosed, what else could it
7 be, right?
8 BY MR. PAK:
9   Q   Right. So Sonos's construction of the data
10 network is broad enough to cover directly or   12:42:19
11 indirectly sending and receiving data, correct?
12   MR. KAPLAN: Object to form.
13   THE WITNESS: Right, that's true. But my
14 construction, though, was not really focused around
15 the directly part. It was that a data network, as   12:42:43
16 we've already discussed since this morning, doesn't
17 have to be digital packets.
18 BY MR. PAK:
19   Q   Right. But let's look at paragraph 66 again.
20 And it says: 12:43:00
21   "For example, networks may be
22   configured in a ring such that no
23   device both sends and receives data
24   directly to and from another device."
25   Right? But Sonos's construction doesn't say   12:43:11

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1 or doesn't require direct -- directly sending and
2 receiving data, right?
3   MR. KAPLAN: Object to form.
4   THE WITNESS: The intent of this sentence
5 that I wrote here was that "directly" is kind of a   12:43:38
6 substitution for each other. Because obviously in a
7 network, in a ring network, devices are sending data
8 and they're receiving data. But it's not a send and
9 receive between two devices. And that's what I
10 meant by "directly" here. I didn't imply there was   12:43:54
11 nothing in between.
12 BY MR. PAK:
13   Q   So -- sorry.
14   A   No, no.
15   Q   So in that -- so if a network is configured   12:44:03
16 in a ring, you'd agree with me that a device can
17 both send and receive data to and from each other?
18   A   No. Because to and from each other means you
19 have two devices and they're talking back and forth.
20 And in a ring network, one device will send to the   12:44:27
21 next. If it has the token, it will -- let's say
22 it's clockwise orientation and it will send to the
23 next one and receive from the one before it. So
24 it's sending and receiving two different devices,
25 not a two-way communication.   12:44:50

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35 (Pages 134 - 137)

1   Q   What is a token ring network?

2   A   It's a set of devices connected in a network

3 that is -- as I described, think of a circle with

4 multiple points in it. Each of those is a network

5 device. The protocol is such that to avoid what   12:45:12

6 network people call collisions, which is when a

7 bunch of data tries to arrive at the same time, to

8 avoid that they use traffic police kind of system

9 where you can't talk unless you've been told to talk

10 because you have the token. And so data goes around 12:45:36

11 in circles. It can be clockwise. It can be

12 counterclockwise. And sometimes it's a star

13 configuration where there's a -- literally a central

14 node and everybody communicates through, or

15 sometimes it's a controller. So it's a different   12:45:51

16 configuration for a network topology.

17   Q   I'd like to introduce a new exhibit here. I

18 uploaded a new exhibit marked as Exhibit 11.

19   Do you see that?

20   A   Yes. I'm waiting for it to open. I see it.   12:46:21

21   (Exhibit 11 was marked for identification

22   electronically and is attached hereto.)

23 BY MR. PAK:

24   Q   Do you recognize this document?

25   A   Yes.   12:46:33

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1   Q   This was attached as Appendix L to

2 Dr. Schmidt's declaration, and you reviewed this

3 document, right?

4   A   I did, yes.

5   Q   I want to take a look at the last page, PDF   12:46:42

6 page 6.

7   Do you see the token ring network

8 configuration at the bottom left?

9   A   I see it.

10   Q   So in this token ring network configuration,   12:46:56

11 can a given device send data to or receive data from

12 another device?

13   A   Yes, but not from the same device in both

14 directions.

15   Q   Okay. And in the last sentence below that   12:47:17

16 configuration, it says:

17   "Any PC can grab a passing token

18   and attach data and the address of

19   another PC to it, as each PC in turn

20   watches for tokens that are addressed   12:47:41

21   to it."

22   Right?

23   A   Yes.

24   Q   So you're saying in this configuration --

25 let's pick one example. There's five PCs, right?   12:48:10

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1   A   Yes.

2   Q   Let's look at the top right PC. So this top

3 right PC can receive data from one of these PCs,

4 correct?

5   A   Assuming that the token protocols were   12:48:32

6 followed, yes.

7   Q   From what devices can this PC receive data

8 from?

9   A   From whichever device decided to address the

10 token to that PC.   12:48:56

11   Q   So it can be any one of the four other

12 devices on this token ring network, correct?

13   A   It can, although you'll have to -- if it's

14 the one next to or below to the right, it would have

15 to wait a while until it gets there because it has   12:49:19

16 to go through all the other ones. But yes.

17   Q   So can that PC on the top right transmit data

18 to any of the four other PCs in the token ring

19 network?

20   A   Again, yes, if it decides it wants to   12:49:36

21 transmit to one of them and puts that information on

22 the token and addresses it to that PC, yes, it can

23 do that.

24   Q   Okay. And I want to go back to your

25 declaration now, looking at paragraph 67. On page   12:49:53

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1 24.

2   A   Yes.

3   Q   It says:

4   "Various publications also

5   confirm that unidirectional data   12:50:08

6   networks were well known in the art."

7   And you relied on U.S. patent

8 No. 6,081,907.

9   Do you see that?

10   A   I do.   12:50:19

11   Q   And you would have to go to the electronic

12 exhibit, because I want to look at PDF page 157.

13   A   Okay. That was Exhibit 9?

14   Q   Yes, correct.

15   MR. KAPLAN: Which PDF page?   12:50:51

16   MR. PAK: PDF page 157.

17   THE WITNESS: I'm looking for an easier way

18 besides scrolling.

19   MR. KAPLAN: I don't know that there is.

20   THE WITNESS: I'm almost there. Okay.   12:51:30

21   Wait. I'm sorry. Are we talking about the

22 monthly unique users graph?

23 BY MR. PAK:

24   Q   No. Hold on one second. I'm putting it in

25 the chat right here.   12:51:56

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36 (Pages 138 - 141)

1   MR. KAPLAN: 157 for me is the '907 patent.
2   THE WITNESS: Oh, I had 57. Okay.
3 BY MR. PAK:
4   Q   There's a little scroll controls you can --
5   A   Yeah.   12:52:13
6   Q   Yeah.
7   A   Okay. I see it.
8   Q   Okay. And this is a copy of the '907 patent
9 provided as an exhibit to your declaration, right?
10   A   Yes.   12:52:36
11   Q   Okay. And I want to go down to PDF page 165.
12 And I want to focus on the background section of the
13 '907 patent.
14   A   Okay.
15   Q   Okay. And the first paragraph of the   12:52:58
16 background section says:
17   "Conventional computer networks
18   are bidirectional, allowing data
19   communication in both directions
20   between servers and clients.   12:53:08
21   Transmitting data over these
22   bidirectional data networks has been a
23   mainstay of computer technology for
24   many years and the communication
25   protocols are well established."   12:53:20

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1   Do you see that?
2   A   Yes.
3   Q   All right. And the third paragraph in the
4 background section, could you actually read that
5 paragraph for me.   12:53:31
6   A
7   "Apart from the classic
8   bidirectional data networks, there is
9   an increasing interest in the use of
10   broadcast or multicast networks to   12:53:40
11   deliver computer data and other
12   content to clients. These types of
13   distribution networks are
14   unidirectional in that data flows from
15   the server to the clients, but no   12:53:50
16   return communication is possible over
17   the same communication path."
18   More?
19   Q   That's okay.
20   So the '907 patent actually distinguishes the   12:54:03
21 classic bidirectional data network from a
22 unidirectional broadcast or multicast network,
23 correct?
24   A   Yes.
25   MR. KAPLAN: Object to form.   12:54:17

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1 BY MR. PAK:
2   Q   Okay. Let's take a look at Column 3, the
3 second paragraph. It says:
4   "The bidirectional data network
5   28 represents various types of   12:54:33
6   networks, including the internet, a
7   LAN, local area network, a WAN, wide
8   area network, and the like."
9   Do you see that?
10   A   I do.   12:54:46
11   Q   In the next paragraph it says:
12   "The broadcast center 26 receives
13   the data served from the content
14   servers 22(l) through 22(K) over the
15   network 28, and broadcasts the data   12:55:02
16   over a broadcast network 30 to the
17   clients 24(l) through 24(M)."
18   Do you see that?
19   A   I do.
20   Q   Now, if you look at Figure 1 of the '907   12:55:15
21 patent, and it's PDF page 158, you see there's a
22 separate bidirectional data network 28 and a
23 broadcast network 30, right?
24   A   28 and 30, yes, I see it.
25   Q   So you'd agree with me that the bidirectional   12:55:45

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1 data network 28 and broadcast network 30 in the '907
2 patent are different networks, right?
3   MR. KAPLAN: Object to form.
4   THE WITNESS: That's what is shown in this
5 diagram. They're showing an example that has both   12:56:11
6 in there.
7 BY MR. PAK:
8   Q   As shown in Figure 1, you'd agree that data
9 network 28 is bidirectional, whereas the broadcast
10 network 30 is unidirectional, correct?   12:56:24
11   A   Yes, that's what is being disclosed.
12   Q   Is there anywhere in the '907 patent that
13 mentions that broadcast network 30 is a data
14 network?
15   MR. KAPLAN: Object to form.   12:56:43
16 BY MR. PAK:
17   Q   And we can take a minute if you need a minute
18 to review the patent.
19   A   Yeah, let me take a minute.
20   So Column 3, line -- the paragraph that   12:57:30
21 starts at line 33, it says:
22   "The broadcast network 30 can be
23   implemented in a variety of ways. For
24   instance, the broadcast network might
25   be implemented as a wireless network   12:57:55

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37 (Pages 142 - 145)

1   configured for one-way transmission,
2   i.e., satellite, radio, microwave
3   et cetera. The broadcast network
4   might also be a network that supports
5   two-way communication, but is   12:58:08
6   predominantly used for unidirectional
7   multicasting from the broadcast center
8   26 to many clients simultaneously."
9   Q So in that sentence, does the patent use the
10 word "data network"?   12:58:29
11   A Well, as we've said before several times,
12 wireless networks that transmit data are data
13 networks. And so it doesn't say data network when
14 it talks about ATM or Ethernet or anything else.
15 These are all data networks.   12:58:54
16   Q Why does the patent use the term "data
17 network" when it describes data network 28, but
18 doesn't use the term "data network" when it talks
19 about broadcast network 30?
20   MR. KAPLAN: Object to form.   12:59:09
21   THE WITNESS: I don't know what they had in
22 mind in their language to write it that way, but --
23 I don't know. I can't answer why they said it that
24 way.
25 ////

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1 BY MR. PAK:
2   Q Let's look at Column 4 of the '907 patent.
3 If you look at line 22 --
4   A Yes.
5   Q It says: 12:59:45
6   "The packet encoder 52
7   encapsulates packets of data with
8   appropriate headers for transmission
9   over the data network and broadcast
10   network."   12:59:57
11   Do you see that?
12   A Yes.
13   Q So this patent discloses that the
14 bidirectional data network 28 and the broadcast
15 network 30 both transmit data in the form of data   01:00:12
16 packets, right?
17   A I can indirectly assume that based on this
18 sentence.
19   Q Do you see any disclosure in the '907 patent
20 where data that is transmitted over the data network   01:00:33
21 or the broadcast network is not in the form of data
22 packets?
23   MR. KAPLAN: If you need to review the
24 patent, you can.
25 BY MR. PAK:

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1   Q Sure. Take a minute if you need a minute to
2 review.
3   A I think it goes back to Column 3, the
4 paragraph that I was reading before, line 33 --
5 actually, line 36 where it gives examples.   01:00:59
6 Satellite, radio, and microwave. What we talked
7 about before, satellite may or may not be data. But
8 radio and microwave is -- may not be data packet,
9 but radio and microwave are most likely not packet
10 based. So it's certainly possible the way they   01:01:25
11 wrote it.
12 BY MR. PAK:
13   Q Let's take a look at the figures here. And I
14 want to take a look at Figure 4. Let me see if I
15 can find the description for it.   01:01:58
16   Actually, let's take a look at Column 5, line
17 35. The paragraph says:
18   "Figure 4 shows exemplary steps
19   in a method for serving data packets
20   over the unidirectional network."   01:02:21
21   Do you see that?
22   A Yes.
23   Q So Figure 4 is describing a method specific
24 to transmitting data packets over broadcast network
25 30, right?   01:02:35

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1   MR. KAPLAN: Object to form.
2   THE WITNESS: It's describing a method, but
3 not all the methods, right? Because we talked about
4 other possibilities. In this paragraph it's a
5 method, yes.   01:02:47
6 BY MR. PAK:
7   Q And then Column 6, line 15, it says:
8   "Figure 5 shows the byte-wise
9   technique for generating a redundancy
10   packet from multiple data packets   01:03:25
11   within a redundancy group."
12   Do you see that?
13   A I'm sorry. I heard it, but I missed which
14 paragraph we're in.
15   Q Column 6, line 15.   01:03:37
16   A Yes, I see it.
17   Q So Column 5 again is describing a certain
18 technique for generating packets, right? Data
19 packets?
20   MR. KAPLAN: Object to form.   01:03:54
21   Do you mean Figure 5?
22 BY MR. PAK:
23   Q Yeah, I'm sorry. Let me rephrase.
24   Figure 5 is illustrating a specific technique
25 for generating data in the form of data packets,   01:04:09

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38 (Pages 146 - 149)

1 right?

2   A   In this paragraph it's talking about a

3 specific aspect of it, aspect of the redundancy

4 formatter, I think is what they're talking about

5 here.   01:04:35

6   Q   Right. But, generally speaking, Figure 5 is

7 talking about data packets, correct? It's talking

8 about data in the form of data packets.

9   MR. KAPLAN: Object to form.

10   THE WITNESS: It is. I'm just looking a   01:04:50

11 little further down where it says it's illustrative

12 for example purposes. "Other computations may be

13 used" -- this is line 30 of the same column.

14   So there are examples that involve packets, I

15 agree with that. But they're also saying there are   01:05:20

16 other ways.

17 BY MR. PAK:

18   Q   Okay. And then Column 7, second paragraph,

19 it says:

20   "Figure 6 shows an exemplary data   01:05:31

21   structure 110 for data packet formed

22   by packet encoder 52 and redundancy

23   formatter 54."

24   Do you see that?

25   A   I see it.   01:05:42

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1   Q   So we have Figure 4 is also talking about

2 data packets, right?

3   A   Figure 6, you mean?

4   Q   I'm sorry. So Figure 6 is also talking about

5 data packets, right?   01:06:02

6   A   Yes, it is. It's showing the structure. If

7 you have data packets, this is what they should look

8 like.

9   Q   And the top of column 8, it says:

10   "Figure 7 shows exemplary steps   01:06:12

11   in a method for receiving data packets

12   transmitted over a unidirectional

13   network."

14   Do you see that?

15   A   Yes.   01:06:20

16   Q   So Figure 7 is talking about data packets,

17 correct?

18   A   Yes.

19   Q   So are there any figures in the '907

20 patent -- in the '907 patent that doesn't talk about   01:06:32

21 data packets?

22   MR. KAPLAN: Object to form.

23   THE WITNESS: My reference to this patent was

24 not to address the data packet or not issue. It was

25 to address unidirectional and bidirectional and   01:06:55

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1 possible coexistence.

2   So, no, I don't see any figure -- the figures

3 are focusing on byte patterns and headers and packet

4 related stuff. But, again, this was not my purpose

5 for quoting this patent.   01:07:24

6   MR. PAK: Okay. I want to transition away

7 from discussing data networks and talk about some of

8 the other terms in your declaration. Do you want to

9 take another break or just power through it?

10   Why don't we take a break and come back in   01:07:47

11 ten minutes. Is that okay?

12   THE VIDEOGRAPHER: Does anybody need more

13 time than that?

14   We can go off the record. We're off the

15 record at 1:07 p.m.   01:07:55

16   (Lunch recess.)

17   THE VIDEOGRAPHER: We are on the record at

18 1:43 p.m.

19 BY MR. PAK:

20   Q   So far we talked about various examples of   01:43:32

21 data networks and local area networks. And I just

22 want to run by one more example with you to further

23 understand what local area network means to a person

24 of ordinary skill in the art.

25   So the question here is, if -- if someone   01:43:49

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1 used two cups on a string to communicate with

2 another person, does that amount to communicating

3 over a local area network?

4   A   I thought we covered this in the morning.

5   Q   Yeah, we --   01:44:01

6   A   I think we talked about it --

7   Q   Yeah, in the context of data network, but we

8 haven't talked about it in the context of a local

9 area network.

10   A   I mean, honestly, don't take it personally.   01:44:10

11 It's a little bit of a silly example, over a string,

12 but I guess if we -- if we use the definition that a

13 person would use for networks, this is taking

14 acoustic data and converting it to mechanical form

15 and then -- to transmit, and then converting it back   01:44:40

16 to acoustical at the other end. So in that sense,

17 it is a data network.

18   The criteria I use for whether it's a local

19 area network is you have to have something to

20 compare it to. So stretching the string out to a   01:45:00

21 much larger area would produce a wider area string

22 network, and this would be a local area network. So

23 I think all those definitions are consistent.

24   Q   So communicating using a string, two cups on

25 a string, would amount to a local area network in   01:45:28

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39 (Pages 150 - 153)

1 your opinion?

2   MR. KAPLAN: Objection. Mischaracterizes

3 testimony. Asked and answered.

4   THE WITNESS: Local -- the word "local" only

5 makes sense if there's something else to compare it   01:45:43

6 to that is bigger or smaller.

7   And so, as I say, if there's a larger

8 distance with bigger string, that would be a wide

9 area network on a string and then this would be

10 called local if it was a smaller one. But by   01:45:58

11 itself, it's hard to say because you need a

12 comparison.

13 BY MR. PAK:

14   Q Right. So depending on the length of the

15 string that connects the two cups, right, someone   01:46:08

16 that uses two cups on a string to communicate with

17 another person, that would amount to communicating

18 over a local area network, correct?

19   MR. KAPLAN: Same objections.

20   THE WITNESS: Well, I guess same answer. It   01:46:24

21 depends. There's no -- there's no length of the

22 string that would be -- there's no size of the -- of

23 an actual LAN that we can say if you go past this,

24 you're no longer local area. It's -- as we saw,

25 LANs cover from a building to a hotel to a campus to   01:46:44

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1 a wide area complex.

2   Same for this. It's a local area network

3 compared to something that is a longer distance, for

4 example, but I can't give you a number.

5 BY MR. PAK: 01:47:03

6   Q Sure. But if the string is -- so you're

7 saying that depending on the length of the string,

8 communicating using two cups attached to that string

9 can either be a local area network or a wide area

10 network then, correct?   01:47:18

11   A Yeah, sure.

12   Q Okay. So I want to go on to talk about the

13 media particular playback system term. And if you

14 take a look at paragraph 58 of your declaration. So

15 we're going back to Exhibit 9.   01:47:39

16   A Yes.

17   Q Would you please read paragraph 58 for the

18 record.

19   A Yes.

20   "I disagree with Dr. Schmidt that   01:47:51

21   a POSITA would understand the media

22   particular playback system of Claims

23   3, 15 or 26 to mean media playback

24   system. I have reviewed the

25   prosecution history, but find that it   01:48:04

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1   does not resolve the debate relating

2   to the use of the term 'particular.'"

3   Q Okay. So I want to take a look at the

4 prosecution history of the 615 patent. And just

5 give me a minute to introduce the exhibit.   01:48:18

6   Okay. So I've just uploaded here an exhibit

7 marked as Exhibit 12.

8   Do you see that?

9   A Yes.

10   (Exhibit 12 was marked for identification

11   electronically and is attached hereto.)

12 BY MR. PAK:

13   Q Do you recognize this document?

14   A Yes.

15   Q Okay. So this is Appendix N of Dr. Schmidt's   01:48:56

16 declaration, right?

17   A Yes.

18   Q You know, before we get into his response,

19 you know, just generally speaking, why do you think

20 an applicant would amend its claims during   01:49:14

21 prosecution?

22   MR. KAPLAN: Object to form.

23   THE WITNESS: This sounds like a legal

24 question to me.

25   I don't know. Because of an error, because   01:49:40

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1 of additional facts, a response to the examiner.

2 Those are some reasons I can think of.

3 BY MR. PAK:

4   Q Can you think of any other reasons why an

5 applicant would amend its claims during prosecution?   01:49:57

6   MR. KAPLAN: Object to form.

7   THE WITNESS: No.

8 BY MR. PAK:

9   Q Well, look at this office action response.

10   Do you think the applicant here amended its   01:50:21

11 claims to overcome the cited references?

12   A It's hard for me to speak on behalf of the

13 applicant, the reasons that they had. I can only

14 speak as to, you know, what I see written here.

15   Is there a specific section you want me to   01:50:51

16 look at?

17   Q Yeah, so how about we take a look at the

18 remarks on PDF page 15.

19   A Okay.

20   Q All right. Again, the summary of the office   01:51:10

21 action, it says:

22   "In the non-final office action

23   mailed July 15, 2016, the examiner

24   rejected Claims 1, 6 through 10, 15

25   through 19, and 21 through 29 under   01:51:22

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40 (Pages 154 - 157)

1   pre-AIA 35 U.S.C. Section 1038, as
2   being allegedly unpatentable over
3   DaCosta in view of Dua."
4   Do you see that?
5   A I see it.   01:51:39
6   Q And there are some other, you know, 103
7 rejections with respect to Claims 3, 12 and 20,
8 correct?
9   A Yes.
10   Q Okay. And then looking at Section 3, the   01:51:46
11 response to the 103 rejections, the second sentence
12 says:
13   "For at least the reason that
14   cited references do not teach the
15   subject matter currently recited by   01:52:11
16   applicant's claims, the pending 103
17   rejections should be withdrawn."
18   Do you see that?
19   A I see it.
20   Q Okay. And let's take a look at Claim 1 on   01:52:21
21 PDF page -- PDF page 3.
22   Do you see that the applicant amended
23 Claim 1, right?
24   A Is this the paragraph numbered 2?
25   Q I'm taking -- I'm looking at the amendments   01:52:53

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1 to the claims on PDF page 3.
2   A Oh, sorry, 3.
3   I see it, yes.
4   Q Do you think the applicant here amended
5 Claim 1 to overcome the cited references?   01:53:05
6   A So I probably looked through the cited
7 references, but I don't have them at the tip of my
8 tongue at the moment to be able to answer that
9 accurately.
10   Q Okay. Did you review any of the cited   01:53:26
11 references?
12   A I read through them. I wouldn't say that I
13 reviewed them in the same way that I reviewed the
14 patents.
15   Q Okay. So, again, I want to -- how about I   01:53:41
16 introduce one of the cited references and discuss
17 that. Just give me a minute.
18   I just uploaded an exhibit and marked it as
19 Exhibit 13.
20   Do you see that?   01:54:24
21   A Yes.
22   (Exhibit 13 was marked for identification
23 electronically and is attached hereto.)
24 BY MR. PAK:
25   Q Do you recognize this document?   01:54:35

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1   A I do.
2   Q Okay. And this is one of the patent
3 publications that was cited in the non-final office
4 action mailed July 25th, 2016. Correct?
5   A Yes.   01:55:06
6   Q Okay. And you reviewed this reference,
7 right?
8   A As I said, I read through it but mostly
9 looked at the comments. So I didn't review it in
10 the same way that I would review an actual patent in   01:55:21
11 this case, but I -- I'm familiar with it.
12   Q Sure, that's fair.
13   I want to take a look at paragraph 57, so on
14 PDF page 24. Would you please read the second
15 sentence in paragraph 57.   01:55:47
16   A The second sentence?
17   Q Yes.
18   A Okay.
19   "The term 'media player'
20   generally refers to electronic devices   01:56:04
21   that are capable of processing media
22   such as audio, video, images,
23   presentations, animation, and internet
24   content, for example, cellular phones,
25   personal digital assistants (PDAs),   01:56:17

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1   music players, game players, video
2   players, cameras and the like."
3   Q Okay. And I want to skip to paragraph 142
4 now. It's on PDF page 32.
5   A Yes.   01:56:41
6   Q Would you please read that first sentence on
7 paragraph 142.
8   A Yes.
9   "Finally, the device's media
10   processing capabilities 461 are listed   01:56:47
11   in the RFID transmission data 450.
12   This is" --
13   Q Actually, please keep going. Read the second
14 sentence.
15   A   01:56:58
16   "This information indicates the
17   device's ability to process media
18   assets that are in specific formats."
19   Q Okay. And the patent further discusses some
20 example media formats, correct?   01:57:11
21   A Correct.
22   MR. KAPLAN: Object to form.
23   THE WITNESS: It does.
24 BY MR. PAK:
25   Q And looking at paragraph 143, could you   01:57:18

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41 (Pages 158 - 161)

1 please read the first sentence.
2 A
3   "This type of information allows
4   media player 100 to only transmit
5   media assets which are supported by   01:57:28
6   the target devices."
7 Q Would you please read the second sentence in
8 full.
9 A Oh, sure.
10   "This information also   01:57:38
11   allows either or both of the target
12   device and media player 100 to convert
13   media assets into supported formats
14   before transmission to the other when
15   required."   01:57:59
16 Q Okay. So based on, you know, these -- this
17 disclosure that we -- that I just had you read, do
18 you agree that Dua disclosed a media player that can
19 play particular media formats?
20 A Yes.   01:58:20
21 Q Do you agree that Dua disclosed a media
22 player that can play particular types of media?
23 A They disclosed a --
24 MR. KAPLAN: Object to form.
25 THE WITNESS: They disclosed a -- the ability 01:58:33

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1 to play back multiple different types of media.
2   I think that's what you're asking, yes?
3 BY MR. PAK:
4 Q Right. So just to clarify, so does -- do you
5 agree Dua discloses a media player that can play   01:58:48
6 particular types of media?
7 MR. KAPLAN: Object to form.
8 THE WITNESS: I guess I'm trying to
9 understand how you're using the word "particular"
10 here.   01:59:13
11   It's -- they list a number of media by
12 example, but it's not clear to me that they're
13 excluding others. So I'm not sure how to answer
14 that.
15 BY MR. PAK: 01:59:27
16 Q Yeah, so let me reword this.
17   Does Dua disclose a media player that can
18 play audio?
19 A Yes.
20 Q Does Dua disclose a media player that can   01:59:39
21 play video?
22 A Yes.
23 Q So Dua discloses a media player that can play
24 any particular type of media, right?
25 MR. KAPLAN: Object to the form.   01:59:55

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1   THE WITNESS: Well, under audio, they list
2 specific formats for that audio, but not all
3 possible. So I think "any" might be too broad
4 because they don't list -- it's hard to say.
5 BY MR. PAK: 02:00:11
6 Q All right. But Dua discloses a media player
7 that can play different types of multimedia, right?
8 A Right, different types of audio, different
9 types of video, and graphics.
10 Q Okay. So now let's go back to the office   02:00:32
11 action response, Exhibit 12.
12   And I want to take a look at Claim 3. And
13 it's on PDF page 4.
14   Do you see that?
15 A Yes.   02:00:59
16 Q What amendments did the applicant make to
17 Claim 3?
18 MR. KAPLAN: Object to form.
19 THE WITNESS: I'm sorry, Claim 3, PDF page 4
20 starts -- is a half paragraph. No, no, sorry.   02:01:15
21 BY MR. PAK:
22 Q Yeah, so Claim 3, you know, starts from PDF
23 page 4 and ends at PDF page 5, right?
24 A Yes.
25 Q Okay. So what -- so looking at the   02:01:33

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1 amendments to Claim 3, could you please walk through
2 all the amendments the applicant made in this office
3 action response.
4 MR. KAPLAN: Objection. The document speaks
5 for itself.   02:01:50
6 THE WITNESS: I assume it's the underlined
7 words of the amendment.
8 BY MR. PAK:
9 Q Yeah. So, you know, I'm not trying to trick
10 you here. So the underlined -- the underlined words 02:01:59
11 represent words that were added.
12 A Okay.
13 Q And the strike -- and the strike through
14 represents terms, phrases that were deleted.
15   So I really just want, you know, to go over   02:02:14
16 all the amendments. You know, can you walk through
17 what amendments were made.
18 A Sure. So they added the word "particular" in
19 several places. "Particular playback device."
20 "Media particular playback system."   02:02:36
21   And then "wherein the first zone includes the
22 particular playback device."
23   So all the additions have to do with
24 "particular" except for the last one that they
25 added, "playing back multimedia content in   02:02:55

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42 (Pages 162 - 165)

1 synchrony."
2   And then they removed "initiating playback"
3 in two locations.
4   Q Okay. So looking at the amendments to
5 Claim 3, do you agree that the applicant added the   02:03:13
6 word "particular" in front of the word "playback"
7 throughout Claim 3?
8   A Yes, except for one location, second to the
9 last line.
10   MR. KAPLAN: Object to form.   02:03:34
11   THE WITNESS: Actually in a couple places.
12 It's not every "playback" that has "particular."
13 It's selective. The word "particular" was not added
14 in front of every time "playback" appears. Only
15 some.   02:03:53
16 BY MR. PAK:
17   Q Well, the word "particular" was -- all right,
18 I see.
19   So where it says "at least one additional
20 playback device," you're saying it doesn't say "at   02:04:02
21 least one additional particular playback device."
22 Is that right?
23   A Oh, that wasn't the only -- the second to
24 last line of the previous page, where it says
25 "control playback by the playback device," they did   02:04:22

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1 not add the word "particular" there.
2   Q Is "media playback system" a broader term
3 than "media particular playback system"?
4   A That's --
5   MR. KAPLAN: Object to form.   02:04:41
6   THE WITNESS: That's the part that was
7 difficult to ascertain. So that is one way to
8 interpret that, that it plays back only particular
9 media.
10   The other one is that there's all kinds of   02:04:56
11 playback systems, and I provided an example. It
12 plays -- records and plays back other kind of data
13 that is not media. And this would be particular to
14 media.
15   So it can be particular to all kinds of   02:05:08
16 media, particular to one media, or a typographical
17 error, as was indicated by Sonos. I couldn't tell
18 which of those three -- and there may be others.
19 And that was the reason for my opinion.
20 BY MR. PAK: 02:05:26
21   Q Sure. So before Claim 3 was amended in this
22 office action response, do you think Claim 3 was
23 indefinite?
24   So, you know, let me ask it this way. Do you
25 think Claim 3 was indefinite before the applicant   02:05:42

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1 amended "media playback system" to "media particular
2 playback system"?
3   MR. KAPLAN: Object to form. Scope.
4   THE WITNESS: So are you asking if I had read
5 this without the word "particular" in the amendment,   02:06:05
6 would I still have the same opinion? Is that --
7 BY MR. PAK:
8   Q Yeah. So, you know, before this claim was
9 amended, right, you know, it used the term "media
10 playback system" instead of "media particular   02:06:19
11 playback system," right?
12   A Right.
13   Q So before Claim 3 was amended to use --
14 amended to use "media particular playback system,"
15 would a person of ordinary skill in the art   02:06:35
16 understand Claim 3? That's what I'm trying to ask.
17   A Right. Probably. Although I'm kind of
18 reforming an opinion by just quickly reading through
19 this paragraph, but I'm just reading it as if the
20 word "particular" isn't there, and it would just be   02:07:13
21 "media playback," right?
22   Q Right. So if you substituted the "particular
23 playback system" back to "media playback system," a
24 person of ordinary skill in the art would understand
25 Claim 3, correct?   02:07:29

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1   A Well, but they didn't have "media playback
2 system" in Claim 3. It's not like they substituted.
3 They just added the word "particular" in front of
4 "playback," right?
5   Am I reading that correctly?   02:07:46
6   Q Yeah. Well, it says "a media particular
7 playback system," right, currently, as amended?
8   Do you see that?
9   How about you read the first four lines of
10 the claim before you get to the "wherein" clause.   02:08:21
11   A Wait, I'm sorry, am I looking at the same
12 paragraph?
13   Q Yes, it's --
14   A This is the bottom of page 3 in the document,
15 that paragraph, right?   02:08:35
16   Q Right. So let me read -- let me read Claim 3
17 as amended.
18   A Okay.
19   Q It says:
20   "The method of Claim 1 wherein   02:08:40
21   detecting the set of inputs to
22   transfer playback from the control
23   device to the particular playback
24   device comprises detecting a set of
25   inputs to transfer playback from the   02:08:52

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43 (Pages 166 - 169)

1   control device to a particular zone
2   group of a media particular playback
3   system that includes a first zone and
4   a second zone."
5   Do you see that?   02:09:01
6   A Yes.
7   Q Okay. Before that -- before that claim
8 limitation was written, right, it said "a media
9 playback system," not "a media particular playback
10 system," correct?   02:09:18
11   A Correct.
12   Q So if we changed "a media particular playback
13 system" back to "a media playback system," would a
14 person of ordinary skill in the art understand what
15 Claim 3 means?   02:09:35
16   A The problem is I was assuming your question
17 meant to remove all "particulars." But you're
18 saying just to remove the one?
19   I think I can agree that "media playback" is
20 more general than "media particular."   02:10:30
21   Q Right. So you understand this claim -- you
22 understand Claim 3 if it didn't say "media
23 particular playback system" and instead it said
24 "media playback system," correct?
25   A I would understand it better, yes.   02:11:01

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1   Q Do you think the applicant amended "media
2 playback system" to "media particular playback
3 system" to overcome the cited references?
4   A I don't know how to answer that. You'd have
5 to ask the applicant.   02:11:25
6   Q Well, we talked about the Dua reference,
7 right?
8   A Yes.
9   Q And the Dua reference disclosed a media
10 player that can play particular media formats,   02:11:33
11 right?
12   A Right.
13   Q And we talked --
14   A But there are many ways to respond to it. So
15 I don't know if that was the only reason, is what   02:11:51
16 I'm trying to say. I can't put myself in their
17 shoes.
18   Q Right. But you understand that Dua discloses
19 a media player that can play different kinds of
20 media formats and different types of media, right?   02:12:08
21   A Yes.
22   Q So why do you think the applicant amended
23 "media playback system" to be a particular system --
24 "a media particular playback system" if Dua already
25 teaches a media player that can play different kinds   02:12:28

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1 of media formats and different types of media?
2   MR. KAPLAN: Objection. Asked and answered.
3   THE WITNESS: Yeah, I don't know the strategy
4 they had in amending the claim.
5 BY MR. PAK: 02:12:48
6   Q But do you agree with me that amending "media
7 playback system" to "media particular playback
8 system" would not overcome the teachings of Dua?
9   MR. KAPLAN: Object to form.
10   THE WITNESS: It depends how they conceive --   02:13:07
11 or perceive the word "particular". If they were
12 trying to make this broader than the formats that
13 Dua was listing, then maybe that was their strategy.
14 So in their mind, they're trying to say it's
15 broader.   02:13:26
16   But, again, I don't -- I don't know why they
17 used the word "particular".
18 BY MR. PAK:
19   Q What does it mean to play a particular media
20 format?   02:13:43
21   A To play a particular media format? It means
22 the system is instructed to start playing that
23 format, that content in that format.
24   Q So does Dua disclose a system that's
25 instructed to start playing a particular media   02:14:17

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1 format?
2   A He does. And he lists examples of those
3 formats.
4   Q What does it mean to play a particular type
5 of media?   02:14:35
6   A Isn't that the same answer -- or the same
7 question? I'm not sure -- as opposed to the format
8 you mean?
9   Q Yeah. So, you know, there's -- you can play
10 a particular type of media format, right, and that   02:14:55
11 would be like an MP3 or 4 and the like, correct?
12 But you can also play a particular type of media,
13 which could be video or audio, text and the like,
14 correct? Do you follow?
15   A Yes.   02:15:13
16   MR. KAPLAN: Object to form.
17 BY MR. PAK:
18   Q Okay. So in that context, does Dua disclose
19 a system that can play a particular type of media?
20   A He discloses several types of media,   02:15:40
21 pictures, images, PowerPoint presentations, audio,
22 video. Yes.
23   Q So when the applicant amended "media playback
24 system" to "media particular playback system," would
25 you agree with me that amending "media playback   02:16:11

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44 (Pages 170 - 173)

1 system" to "media particular playback system" would
2 not overcome the teachings of Dua?
3   MR. KAPLAN: Objection. Asked and answered.
4   THE WITNESS: I mean, that's a tough call.
5 That's why we have examiners, right? I don't know   02:16:31
6 if I can make that call.
7 BY MR. PAK:
8   Q   Well, are there any other reasons why the
9 applicant would amend "media playback system" to
10 "media particular playback system"?   02:16:53
11   A   Other than trying to respond to the examiner
12 or -- as I said, you know, that would be one reason.
13 Or they thought they had made an error and they're
14 trying to correct it. Those are the two main
15 reasons in my head.   02:17:10
16   Q   Okay. So take a look at PDF page 15 again,
17 "Summary of the Office Action".
18   A   Yes.
19   Q   In the "Summary of the Office Action," it
20 talks about 103 rejections, correct?   02:17:34
21   A   Yes.
22   Q   Do you see any other rejections?
23   A   I'm sorry, can you remind me what the 103
24 rejection is?
25   Q   Yeah. So 103 rejection is an obviousness   02:17:48

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1 type rejection.
2   There's also 102 type rejections, which could
3 be anticipation -- anticipatory type rejections,
4 right?
5   And then you also have 112 rejections, which   02:18:02
6 might have to do with, you know, formality of the
7 claims or, you know, maybe the patent lacks written
8 description of enablement and the like. Or it might
9 be indefinite, right?
10   A   Right. Okay.   02:18:18
11   Q   All right. So with that understanding here,
12 do you see in the Summary of the Office Action there
13 are only 103 rejections, right?
14   A   Right.
15   Q   And you don't see any 112 rejections,   02:18:28
16 correct?
17   A   Correct.
18   Q   So the -- so the applicant here was
19 responding to the examiner's 103 rejections in the
20 non-final office action of July 25, 2016, correct?   02:18:44
21   MR. KAPLAN: Object to form.
22   THE WITNESS: Yes. I presume that's what --
23 the response that was written by the applicant,
24 right?
25 BY MR. PAK: 02:18:56

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1   Q   Right.
2   A   Paragraph 3?
3   Q   Yeah. And looking at Claim 3, you're not
4 entirely sure why the applicant amended "media
5 playback system" to "media particular playback   02:19:12
6 system," correct?
7   A   I'm not sure, no.
8   Q   But you do understand that Dua discloses a
9 media particular playback system, correct?
10   A   Correct. But I guess the question is, is   02:19:29
11 that the only way to respond to that rejection?
12 Without being the applicant and knowing more, I
13 couldn't answer that.
14   But it was a response presumably to address
15 the concern. That doesn't make it the correct   02:19:42
16 response. It's a response.
17   Q   Right. And the only other reason why an
18 applicant would amend its claims, other than
19 responding to an examiner, would be to correct an
20 informality, such as a typographical error, correct? 02:19:59
21   MR. KAPLAN: Object to form.
22 Mischaracterizes. Leading.
23   Go ahead.
24   THE WITNESS: Those are two reasons I have
25 off the top of my head. I mean, there could be   02:20:12

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1 other reasons that I'm not -- I don't think those
2 are the only two reasons to list.
3 BY MR. PAK:
4   Q   Sitting here today, can you think of any
5 other reasons why an applicant would amend its   02:20:24
6 claims other than those two reasons?
7   A   I don't know. The marketing department
8 decided that it would be important to have certain
9 words in the patent?
10   I'm thinking -- I'm trying to think of other   02:20:41
11 reasons. There could be a lot of other reasons. It
12 depends. They become a public record, obviously, so
13 that could be another reason.
14   Q   Why do you think the applicant would amend
15 "media playback system" to "media particular   02:20:59
16 playback system" if amending "media playback system"
17 to "media particular playback system" would render
18 the claim indefinite, in your opinion?
19   A   Well, I don't think they asked me my opinion,
20 so how would they know that this would become an   02:21:22
21 issue?
22   At the time, I'm sure it made sense to them
23 for some reason that we don't know, that I don't
24 know.
25   Q   That's fair.   02:21:31

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45 (Pages 174 - 177)

1   Now, I want to go back to the '206 patent
2 now. It's Exhibit 10. And I want to take a look at
3 column 8.
4   A Okay.
5   Q Okay. And you don't have to read this out   02:22:11
6 loud, but could you please review lines 7
7 through 36.
8   A 7 through 36?
9   Q Yeah. And then we can discuss.
10   And just let us know when you're finished.   02:22:35
11   A Okay.
12   Q Okay. Does the '206 patent disclose two
13 mechanisms for grouping zone players?
14   MR. KAPLAN: Object to the form.
15   THE WITNESS: I'm trying to see where it   02:23:34
16 says another mechanism. I see what it says, but it
17 starts -- the line starts with "One mechanism for
18 joining zone players."
19 BY MR. PAK:
20   Q Sure. And what is that one mechanism?   02:23:46
21   A It says:
22   "To link a number of zone players
23   together to form a group."
24   Q And what does the '206 patent say that one
25 mechanism entails to link a number of zone players   02:24:07

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1 together to form a group?
2   A So they -- one second.
3   "The user may manually link each
4   zone player or room one after the
5   other," sequentially presumably.   02:24:24
6   Q So that's the -- that's the one mechanism
7 disclosed in the '206 patent, right?
8   A Yeah.
9   MR. KAPLAN: Object to form.
10 BY MR. PAK: 02:24:37
11   Q Is there another mechanism for linking a
12 number of zone players together to form a group?
13   A I guess you must be referring to line 23
14 perhaps:
15   "According to one embodiment, a   02:24:57
16   set of zones can be dynamically linked
17   together using one command."
18   Is that the other mechanism that you're
19 referring to?
20   Q Yes.   02:25:16
21   A Okay.
22   Q So the '206 patent discloses example zones,
23 correct?
24   A Right. They have a list of what they call
25 zones and then some names, yeah.   02:25:30

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1   Q What are the example zones disclosed in
2 column 8?
3   A Bathroom, bedroom, den, dining room, family
4 room and foyer.
5   Q Okay. And looking at column 8, line 29,   02:25:45
6 could you please read that -- read the first three
7 sentences.
8   A Okay.
9   "For instance, a Morning zone
10   scene/configuration command would link   02:26:09
11   the bedroom, den and dining room
12   together in one action. Without this
13   single command, the user would need to
14   manually and individually link each
15   zone. Figure 3A provides an   02:26:21
16   illustration of one zone scene where
17   the left column shows the starting
18   zone grouping. All zones are
19   separate. The column on the right
20   shows the effects of grouping the   02:26:35
21   zones to make a group of three zones
22   named after Morning."
23   Q Okay. So I want to take a look at Figure 3A
24 now. It's on PDF page 8.
25   A Yes.   02:27:06

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1   Q So on the left side of the arrow, you know, I
2 see bathroom, bedroom, den, dining room, family room
3 and foyer, right?
4   A Yes.
5   Q What do -- what does the left side of the   02:27:17
6 arrow represent, or those rooms represent?
7   A Based on what we just read, they call them
8 zones.
9   Q And the right side of the arrow -- well, what
10 does -- what does the right side of the arrow   02:27:42
11 indicate in Figure 3A?
12   MR. KAPLAN: Object to form.
13   THE WITNESS: It's the same -- the same
14 zones, but the -- but three of them have been put in
15 a -- some kind of group. And that group is -- has   02:27:54
16 the bracket that indicates that it's called Zone
17 Configuration/Scene.
18 BY MR. PAK:
19   Q What are -- what are the three zones that are
20 put into some kind of group?   02:28:22
21   A Bedroom, den and dining room.
22   Q Do you know what the name of that -- what the
23 patent describes as -- let me start over.
24   What does the patent call this group that
25 includes the three zones, bedroom, den and dining   02:28:49

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46 (Pages 178 - 181)

1 room?

2 A Sorry, what was that column? Was it

3 column 8?

4 Q Yes, column 8.

5 A And it says "to make a group of three zones   02:29:03

6 named after Morning." A little odd that the word

7 "after" is there, but okay.

8 Q Yeah, go -- look at the sentence before. You

9 know, it says:

10   "Figure 3A provides an   02:29:32

11   illustration of one zone scene where

12   the left column shows the starting

13   zone grouping. All zones are

14   separate. The column to the right

15   shows the effect of grouping the zones   02:29:45

16   to make a group of three zones named

17   after Morning."

18   Right?

19 A Right.

20 Q So looking at Figure 3A, the group of zones,   02:29:52

21 bedroom, den and dining room, that's an illustration

22 of a zone scene, correct?

23   MR. KAPLAN: Object to form.

24   THE WITNESS: So I didn't provide an opinion

25 on what a zone scene is. To define that here kind   02:30:26

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1 of on the fly would be a little premature, or I'd

2 have to look at it more.

3   You know, reading through for the -- for the

4 other opinions that I formed, I found that zone

5 scene represents some kind of grouping, but it has   02:30:43

6 something additional, some kind of theme or

7 attributes that go beyond a simple grouping.

8   But, again, that's not a -- that's not an

9 official opinion yet.

10 BY MR. PAK: 02:30:59

11 Q Okay. So, you know, looking at column 8, you

12 know, where we were before, and it says:

13   "For instance, a Morning zone

14   scene/configuration command would link

15   the bedroom, den and dining room   02:31:14

16   together in one action."

17   Do you see that?

18 A Yes.

19 Q And then, you know, as we discussed, it says:

20   "The column to the right shows   02:31:24

21   the effects of grouping the zones to

22   make a group of three zones named

23   after Morning."

24   Do you see that?

25 A I see.   02:31:32

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1   Q So with respect to Figure 3A, you know, the

2 group of three zones named after Morning, that's

3 referring to the Morning zone scene, correct?

4   MR. KAPLAN: Object to form. Asked and

5 answered.   02:31:52

6   THE WITNESS: Well, but it has -- in line 29

7 it says "Morning zone scene/configuration," and then

8 in Figure 3A it says "zone configuration/scene," the

9 other way around.

10   So I couldn't tell from this for sure without   02:32:13

11 looking further if that is the definition of zone

12 scene or not. It has additional stuff.

13 BY MR. PAK:

14   Q Right. But your understanding of a zone

15 scene is that it's some kind of representation of a   02:32:28

16 grouping that has some additional attributes, right?

17   A Yes, that's my best understanding. The

18 attributes having to do with what throughout the

19 specification is called some kind of themes.

20   Q Why don't we take a look at column 10 of the   02:32:49

21 patent.

22   A Okay.

23   Q And I want to look at line 21 here. It says:

24   "Given a saved scene, a user may

25   activate the scene at any time or set   02:33:21

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1   up a timer to activate the scene at

2   610."

3   Do you see that?

4   A I see it.

5   Q After the user activates the scene, what does   02:33:29

6 the '206 patent say happens next?

7   A So they say "scene" here, which is not clear

8 if they mean zone scene in their own language.

9 That's my first thought.

10   But what -- you're saying what do they say   02:33:59

11 in this sentence?

12   Q Yeah, so let's back up here.

13   And, you know, this is talking about with

14 respect to Figure 6, but at the -- you know, the

15 first paragraph of column 10, says: 02:34:14

16   "The process 600 is initiated

17   only when a user decides to proceed

18   with a zone scene at 602."

19   Do you see that?

20   A Yes.   02:34:26

21   Q So when it talks about a scene at step 610,

22 it's talking about a zone scene, correct?

23   MR. KAPLAN: Object to form.

24   THE WITNESS: Probably, but why don't they

25 just write it to make it clear? It's not -- most   02:34:50

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47 (Pages 182 - 185)

1 likely is my answer.

2 BY MR. PAK:

3 Q Okay. So at 610, you know, I read this

4 before. It says:

5   "Given a saved scene, a user may   02:35:11

6   activate the scene at any time or set

7   up a timer to activate the scene at

8   610."

9   So what does the '206 patent say happens

10 next?   02:35:25

11 A After this action has happened?

12 Q Yes.

13 A It's the next couple of sentences, right?

14 Q So what does that say?

15 A So line 24:   02:35:44

16   "At 612, upon the activation of a

17   saved scene, the process 600 checks

18   the status of the players associated

19   with the scene."

20 Q Okay. So what does -- what does the patent   02:35:56

21 say happens at step 614?

22 A

23   "At 614, commands are executed

24   with the parameters, e.g., pertaining

25   to a playlist and volumes."   02:36:11

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1 Q And what is the next --

2 A Yeah, go ahead?

3 Q Can you keep reading the next two sentences.

4 A Yes.

5   "In one embodiment, data,   02:36:23

6   including the parameters, is

7   transported from a member, e.g., a

8   controller, to other members in the

9   scene so that the players are caused

10   to synchronize an operation configured   02:36:34

11   in the scene. The operation may cause

12   all players to play back a song in

13   identical or different volumes or to

14   play back a pre-stored file."

15 Q So after a user activates a zone scene, data   02:36:51

16 is transported from a member to another member in

17 the zone scene, right?

18   MR. KAPLAN: Object to form.

19   THE WITNESS: So what is a member here?

20 BY MR. PAK:

21 Q So a member here -- you know, you just read

22 it here. It says "transferred from a member, for

23 example, a controller."

24   A member can also be a player, right?

25 A Okay.   02:37:24

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---

1 Q I think -- I think member -- so member here

2 is referring to devices or nodes on the network,

3 right?

4 A Okay.

5 Q So you agree with me that after a user   02:37:36

6 activates a zone scene, data is transported from a

7 member, for example, a controller or a player, to

8 other members in the zone scene, right?

9 A Yes.

10 Q And what does that data that is transported   02:37:57

11 from a member to another member pertain to?

12 A Well, in the example they provide, it says it

13 pertains to a playlist and volumes. So we have to

14 read it the way they say it, right?

15 Q Yeah. So let's take a look at column 10,   02:38:23

16 lines 12 through 20. It starts with "In the example

17 of Figure 1."

18   Do you see that?

19 A Yes.

20 Q Could you please read the first two   02:38:35

21 sentences.

22 A

23   "In the example of Figure 1, the

24   scene is saved in one of the zone

25   players and displayed on controller   02:38:43

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1   142. In operation, a set of data

2   pertaining to the scene includes a

3   plurality of parameters. In one

4   embodiment, the parameters include,

5   but may not be limited to,   02:38:56

6   identifiers, e.g., IP address, of the

7   associated players and a playlist.

8   The parameter may also include

9   volume/tone settings for the

10   associated players in the scene."   02:39:08

11 Q Okay. So returning to my question, after a

12 user activated a zone scene, there is some data that

13 is transported from a member to another member in

14 the scene, right?

15   MR. KAPLAN: Object to form.   02:39:27

16   THE WITNESS: That's what this paragraph

17 seems to describe, yes.

18 BY MR. PAK:

19 Q Right. And that data that's transported from

20 a member to another member is data pertaining to a   02:39:36

21 zone scene, correct?

22   MR. KAPLAN: Object to form.

23   THE WITNESS: Well, it's data -- it's a set

24 of parameters that they want to apply to that zone

25 scene they're sending.   02:39:58

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48 (Pages 186 - 189)

1 BY MR. PAK:

2   Q   Right. So let me ask you this way.

3   So when a scene is saved in one of the zone

4 players and displayed on a controller, right, there

5 is some form of data pertaining to that zone scene   02:40:12

6 that gets saved in the zone player, right?

7   MR. KAPLAN: Object to form.

8   THE WITNESS: This is not the data that we're

9 talking about here that's being sent to it. I'm not

10 sure I understand.   02:40:37

11   There's a scene that's been created. And

12 this to me says that from -- the user can decide

13 from the controller to select that scene -- and I'm

14 paraphrasing -- and send these parameters that we

15 talked about to the zone players in that scene.   02:40:53

16 BY MR. PAK:

17   Q   Okay. So let's look -- let's relook at

18 column 10, lines 12 to 15. It says:

19   "In the example of Figure 1, the

20   scene is saved in one of the zone   02:41:08

21   players and displayed on controller

22   142. In operation, a set of data

23   pertaining to the scene includes a

24   plurality of parameters."

25   Do you see that?   02:41:18

1   A   Yes.

2   Q   Now, when you save a zone scene in one of the

3 zone players, you're really saving data pertaining

4 to the zone scene in one of the zone players,

5 correct?   02:41:29

6   MR. KAPLAN: Object to form.

7   THE WITNESS: I don't know. I don't know

8 what they're saving.

9 BY MR. PAK:

10   Q   Well, the zone player has to save some form   02:41:44

11 of data that represents the zone scene, right, if

12 it's going to save a zone scene?

13   MR. KAPLAN: Object to form.

14   THE WITNESS: I guess what I'm trying to

15 figure out there is, isn't the zone scene the data   02:42:07

16 itself?

17 BY MR. PAK:

18   Q   Well, let me ask -- let me ask you this way.

19   When you want to save a song on your

20 computer, some form of data is saved on that   02:42:27

21 computer, right, that represents the song?

22   A   Well, it's the audio file that is the song.

23   Q   Right. So when you -- when you save a song

24 on a computer, you're saving a -- you're saving a

25 file that represents a song and -- let me just   02:42:49

1 repeat that.

2   So when you save a song on a computing

3 device, you're saving a file that represents a song

4 in the computing device, correct?

5   A   No, I don't agree with that.   02:43:17

6   What is a song? That's an abstract -- the

7 song is the file. So it's not a representation.

8 It's the song. That is the file that you're saving.

9   Q   So when someone says -- so when a user

10 decides to save a song, what happens under the hood,   02:43:40

11 like, how does the computing device save a song?

12   A   The song --

13   MR. KAPLAN: Object to the form.

14   THE WITNESS: Assuming the song is in digital

15 form, the computing device saves the song file which   02:44:02

16 contains a sequence of bits that, when played back,

17 are the song.

18 BY MR. PAK:

19   Q   Yeah, so let me ask you it this way then.

20   When a user tries to save a song from a   02:44:27

21 computer from an Ethernet interface, right, if --

22 the user inputs a command to save the song, right?

23   A   Yes.

24   Q   And the computing device receives that

25 command to save a song, correct?   02:44:57

1   A   Yes.

2   Q   How does the computing device or, you know --

3 starting over here.

4   What action does the computing device do to

5 actually save a song in the computing device?   02:45:14

6   MR. KAPLAN: Object to form.

7   THE WITNESS: Assuming the saving location

8 has -- the saving location has been determined,

9 which is the intermediate step, the computing device

10 will start at the first bit and start writing it to   02:45:31

11 that location until it's finished. In memory or on

12 the hard drive somewhere.

13 BY MR. PAK:

14   Q   So the computing device saves a song in the

15 hard drive or memory, you know, in the form of a   02:45:57

16 file, right?

17   A   I don't know -- the song is a file. It

18 sounds like you're saying the song is something else

19 and then it gets converted to a file, and that's

20 just not the case.   02:46:17

21   The song is the file. Without that, there's

22 no song.

23   Q   Well, let me ask you this way.

24   From a user perspective, right, a user would

25 say that he or she plays a song, right? He or she   02:46:59

1 wouldn't say that he or she plays a file, right, or
2 plays data?
3   A Well, that's the vernacular as opposed to the
4 actual technical. I could point you to a number of
5 users in my department that would say they're   02:47:27
6 playing a data file.
7   So, I mean, I don't think that's -- I mean,
8 maybe a user would say that, but it doesn't make it
9 technically correct.
10   Q All right. Let's talk about this in the   02:47:49
11 context of Microsoft Word then.
12   When you save a Microsoft Word document,
13 right, what format does your computing device save a
14 Microsoft Word document?
15   A It is again a sequence of bits that -- the   02:48:13
16 format is not open to us. It's a Microsoft internal
17 format. So I couldn't tell you what the file looks
18 like. You can only reopen it by using their user
19 interface.
20   Q When you save a Microsoft Word document,   02:48:39
21 you're saving some form of data, right?
22   A I mean, that's -- everything on your computer
23 is data, so yes.
24   Q And that data that is saved represents the
25 Microsoft Word document, right?   02:49:12

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1   A I think it's the same thing. As I said
2 before, it doesn't represent it, it is the Microsoft
3 Word document. It's not like you have another
4 representation. It's the -- it's the only one, and
5 it is the document.   02:49:30
6   MR. PAK: Why don't we take a break now. I
7 think we've been going on for a while. I don't have
8 a whole lot left here. I know it's Friday. I don't
9 want to keep you here too long.
10   THE VIDEOGRAPHER: Off the record at   02:50:06
11 2:50 p.m.
12   (Recess.)
13   THE VIDEOGRAPHER: We are on record at
14 3:02 p.m.
15 BY MR. PAK: 03:02:27
16   Q I want to take a look at paragraph 74 of your
17 declaration.
18   A Yes.
19   Q Would you please read the first sentence.
20   A   03:02:48
21   "Claims 1 and 12 of the '033
22   patent recite transmitting an
23   instruction, and Claims 2 and 3 recite
24   wherein the instruction comprises an
25   instruction."   03:02:56

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1   Q Okay. And during the break I uploaded the
2 '033 patent and marked it as Exhibit 14.
3   (Exhibit 14 was marked for identification
4   electronically and is attached hereto.)
5 BY MR. PAK: 03:03:09
6   Q Do you see that?
7   A Just checking here.
8   Yes.
9   Q And you looked at the '033 patent, correct?
10   A Yes, I did.   03:03:26
11   Q I want to take a look at Claim 1 on PDF
12 page 28.
13   Could you please read the transmitting an
14 instruction limitation that you mentioned in
15 paragraph 74 of your declaration.   03:03:50
16   A I'm still scrolling.
17   Q It's the second to the last page.
18   A Yes. You want me to read the part that has
19 the transmitting the instruction?
20   Q Yeah. How about -- how about you read the   03:04:13
21 transmitting an instruction limitation, you know,
22 all the way -- all the way before the "wherein"
23 clause.
24   A Okay. So line 53?
25   Q Yeah, correct.

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1   A
2   "Based on receiving the user
3   input, transmitting an instruction for
4   at least one given playback device to
5   take over responsibility for playback   03:04:35
6   of the remote playback queue from the
7   computing device."
8   Q Okay. Let's take a look at Claim 2,
9 column 18. Could you please read Claim 2.
10   A   03:04:47
11   "The computing device of Claim 1
12   wherein the instruction comprises an
13   instruction for the cloud-based
14   computing system associated with the
15   media" --   03:04:58
16   Sorry. Let me start over.
17   "The computing device of Claim 1,
18   wherein the instruction comprises an
19   instruction for the cloud-based
20   computing system associated with the   03:05:10
21   media service to provide the data
22   identifying the next one or more" --
23   "the next one or more media items to
24   the given playback device for use in
25   retrieving at least one media item   03:05:22

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1 from the cloud-based computing system
2 associated with the cloud-based media
3 service."
4 Q That's a pretty long claim, right?
5 So the instruction recited in Claim 2 is   03:05:38
6 referring to the instruction for at least one given
7 playback device to take over responsibility for
8 playback of the remote playback queue from the
9 computing device recited in Claim 1, correct?
10 A Yes.   03:06:14
11 Q In other words, the instruction recited in
12 Claim 2 is not referring to the program instructions
13 stored on the non-transitory computer readable media
14 as recited in Claim 1, correct?
15 MR. KAPLAN: Object to form.   03:06:43
16 THE WITNESS: I guess it's not clear what is
17 the difference between the program instructions.
18 Aren't they all instructions? I'm trying to
19 understand the reference here.
20 BY MR. PAK: 03:07:12
21 Q Does the instruction recited in Claim 2 refer
22 to an instruction for the at least one given
23 playback device to take responsibility for playback
24 on the remote playback queue from the computing
25 device in Claim 1, or does it refer to the program   03:07:35

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1 So in that sentence, you understand that
2 wherein -- the term "wherein the instruction"
3 recited in Claim 2 refers to transmitting an
4 instruction term in Claim 1, right?
5 A Yes. I agree with that.   03:09:31
6 Q Okay. So the instruction recited in Claim 2
7 is not referring to program instructions recited in
8 Claim 1, correct?
9 MR. KAPLAN: Object to form.
10 THE WITNESS: I guess that's what I was   03:09:45
11 trying to say before. It's referring to the -- to
12 the instruction that we read in that clause of the
13 claim. But it's still a program instruction.
14 That's all I was trying to say.
15 MR. PAK: Okay. I have no further questions. 03:10:02
16 I appreciate your time, Dr. K.
17 Thanks for your time as well, Marc.
18 MR. KAPLAN: Sure. I'm just thinking for a
19 moment.
20 We'll reserve signature. And no questions   03:10:18
21 for me.
22 THE VIDEOGRAPHER: We are off the record at
23 3:10 p.m. This concludes today's testimony given by
24 Dr. Chris Kyriakakis. Total media used was five and
25 will be retained by Veritext Legal Solutions.   03:10:38

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1 instructions recited in Claim 1?
2 A Well, that's the thing. They're all program
3 instructions, right? So this instruction,
4 whichever -- whatever it's referring to, is a
5 program instruction, right? So I don't see the   03:07:56
6 difference necessarily.
7 Q Well, Claim 1 recites an instruction for
8 the at least one given playback device to take over
9 responsibility for playback of the remote playback
10 queue from the computing device, right?   03:08:16
11 A Right. But at the beginning of Claim 2 is
12 program instructions, when executed by at least one
13 processor, cause the computing device to perform
14 functions comprising -- and then a whole bunch of
15 functions -- and then this instruction clause. So   03:08:35
16 it's --
17 Q Well, let's look at paragraph 74 again in
18 your declaration.
19 A Yes.
20 Q And you say that "Claim 1" -- I'm sorry: 03:08:49
21 "Claims 1 and 12 of the '033
22 patent recite transmitting an
23 instruction, and Claims 2 and 13
24 recite wherein the instruction
25 comprises an instruction."   03:09:04

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1
2   I, CHRISTOS KYRIAKAKIS, do hereby declare
3 under penalty of perjury that I have read the
4 foregoing transcript; that I have made any
5 corrections as appear noted, in ink, initialed by
6 me, or attached hereto; that my testimony as
7 contained herein, as corrected, is true and correct.
8   EXECUTED this _____ day of _____,
9 20____, at _____, _____.
         (City)   (State)
10
11
12
13
        _____
        CHRISTOS KYRIAKAKIS
14
15
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24
25

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1
2
3   I, the undersigned, a Certified Shorthand
4 Reporter of the State of California, do hereby
5 certify:
6   That the foregoing proceedings were taken
7 before me at the time and place herein set forth;
8 that any witnesses in the foregoing proceedings,
9 prior to testifying, were placed under oath; that a
10 record of the proceedings was made by me using
11 machine shorthand which was thereafter transcribed
12 under my direction; further, that the foregoing is
13 an accurate transcription thereof.
14   I further certify that I am neither
15 financially interested in the action nor a relative
16 or employee of any attorney of any of the parties.
17   IN WITNESS WHEREOF, I have this date
18 subscribed my name.
19
20 Dated: June 14, 2021
21
22
23
         Kathleen E. Barney
         KATHLEEN E. BARNEY
24   CSR No. 5698
25

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Appendix Q

OVER
10,000
ENTRIES

Microsoft®

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Dictionary

Fifth Edition

- *Fully updated with the latest technologies, terms, and acronyms*
- *Easy to read, expertly illustrated*
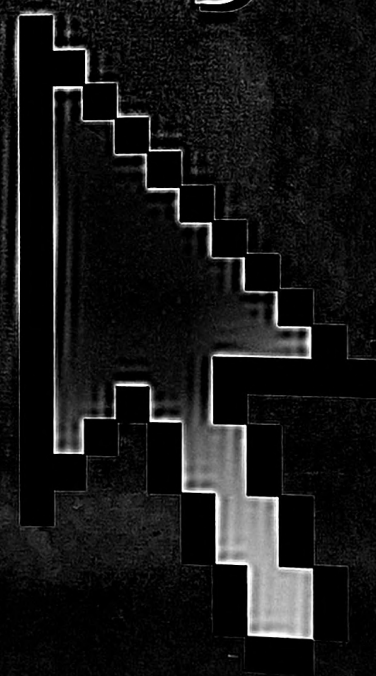- *Definitive coverage of hardware, software, the Internet, and more!*

Exhibit
0003

D

the parts of the system work in harmony so that data is stored safely and accurately. Application programs manage data by receiving and processing input according to the user's commands, and sending results to an output device or to disk storage. The user also is responsible for data management by acquiring data, labeling and organizing disks, backing up data, archiving files, and removing unneeded material from the hard disk.

data manipulation *n.* The processing of data by means of programs that accept user commands, offer ways to handle data, and tell the hardware what to do with the data.

data manipulation language *n.* In database management systems, a language that is used to insert data in, update, and query a database. Data manipulation languages are often capable of performing mathematical and statistical calculations that facilitate generating reports. *Acronym:* DML. *See also* structured query language.

data mart *n.* A scaled-down version of a data warehouse that is tailored to contain only information likely to be used by the target group. *See also* data warehouse.

data medium *n.* The physical material on which computer data is stored.

data migration *n.* **1.** The process of moving data from one repository or source, such as a database, to another, usually via automated scripts or programs. Often data migration involves transferring data from one type of computer system to another. **2.** In supercomputing applications, the process of storing large amounts of data off line while making them appear to be on line as disk-resident files.

data mining *n.* The process of identifying commercially useful patterns, problems, or relationships in a database, a Web server, or other computer repository through the use of advanced statistical tools. Some Web sites use data mining to monitor the efficiency of site navigation and to determine changes in the Web site's design based on how consumers are using the site.

data model *n.* A collection of related object types, operators, and integrity rules that form the abstract entity supported by a database management system (DBMS). Thus, one speaks of a relational DBMS, a network DBMS, and so on, depending on the type of data model a DBMS supports. In general, a DBMS supports only one data model as a practical rather than a theoretical restriction.

data network *n.* A network designed for transferring data encoded as digital signals, as opposed to a voice network, which transmits analog signals.

Data Over Cable Service Interface Specification *n.* *See* DOCSIS.

data-overrun error *n.* An error that occurs when more data is being acquired than can be processed. *See also* bps.

data packet *n. See* packet.

data path *n.* The route that a signal follows as it travels through a computer network.

data point *n.* Any pair of numeric values plotted on a chart.

data processing *n.* **1.** The general work performed by computers. **2.** More specifically, the manipulation of data to transform it into some desired result. *Acronym:* DP. *Also called:* ADP, automatic data processing, EDP, electronic data processing. *See also* centralized processing, decentralized processing, distributed processing.

Data Processing Management Association *n. See* DPMA.

data projector *n.* A device, similar to a slide projector, that projects the video monitor output of a computer onto a screen.

data protection *n.* The process of ensuring the preservation, integrity, and reliability of data. *See also* data integrity.

data rate *n.* The speed at which a circuit or communications line can transfer information, usually measured in bits per second (bps).

data record *n. See* record[1].

data reduction *n.* The process of converting raw data to a more useful form by scaling, smoothing, ordering, or other editing procedures.

data segment *n.* The portion of memory or auxiliary storage that contains the data used by a program.

Data Service Unit *n. See* DDS.

data set *n.* **1.** A collection of related information made up of separate elements that can be treated as a unit in data handling. **2.** In communications, a modem. *See also* modem.

Data Set Ready *n. See* DSR.

data sharing *n.* The use of a single file by more than one person or computer. Data sharing can be done by physically transferring a file from one computer to another, or, more commonly, by networking and computer-to-computer communications.

Appendix R

UNITED STATES INTERNATIONAL TRADE COMMISSION
WASHINGTON, D.C.

Before the Honorable Charles E. Bullock
Chief Administrative Law Judge

In the Matter of **CERTAIN AUDIO PLAYERS AND CONTROLLERS, COMPONENTS THEREOF, AND PRODUCTS CONTAINING THE SAME**	**Inv. No. 337-TA-1191**

REBUTTAL DECLARATION OF MATTHEW B. SHOEMAKE, PH.D.

I, Matthew B. Shoemake, Ph.D. hereby declare as follows:

I.   INTRODUCTION

1.   I have been retained to testify as an expert in this action on behalf of Respondents Google LLC and Alphabet Inc. (collectively, "Respondents").

2.   For this declaration, I have been asked to provide my analysis and expert opinion on the interpretation of the claim term "local area network" (or "LAN" for short) from U.S. Patent Nos. 9,195,258 ("the '258 patent"), 10,209,953 ("the '953 patent"), 10,439,896 ("the '896 patent"), and 8,588,949 ("the '949 patent"), in response to the declarations of Dr. Kevin C. Almeroth and Dr. Jon B. Weissman.

3.   I understand that claim 17 of the '258 patent, claims 7, 12, 22, and 23 of the '953 patent, claim 1 of the '896 patent, and claim 1 of the '949 patent, all of which have been asserted against Respondents, require a "local area network," or "LAN" for short. I understand that the parties dispute how a person of ordinary skill in the art reading these patents at the time of the alleged inventions (which I understand was in the 2003-2004 timeframe) would have understood the term LAN.

1

4.   For purposes of this declaration, I have reviewed Dr. Almeroth's and Dr. Weissman's declarations, the '258 patent, the '953 patent, the '896 patent, the '949 patent, the prosecution histories for these patents, extrinsic evidence related to these patents, and all other evidence discussed below in this declaration.

5.   It is my understanding that discovery is still ongoing. I reserve the right to modify or supplement my opinions, as well as the basis for my opinions, in light of any documents, testimony, or other evidence that may emerge during the course of this matter, including depositions that have yet to be taken.

II.   QUALIFICATIONS

6.   My qualifications are set forth in my June 1, 2020 declaration.

III.   LEGAL STANDARDS

7.   I set forth my understanding below of various legal standards related to claim construction, of which I have been informed by counsel.

A.   Person of Ordinary Skill in the Art

8.   I understand that claim construction is analyzed from the perspective of a person having ordinary skill in the art. I understand that the person of ordinary skill in the art is a hypothetical person of ordinary creativity, not an automaton. I understand that a person of ordinary skill, while not someone who undertakes to innovate, is capable of drawing inferences and taking creative steps based upon that knowledge.

9.   I understand that, in determining the level of skill in the art, courts consider the type of problems encountered in the art, prior art solutions to those problems, rapidity with which innovations are made, sophistication of the technology, and the educational level of active workers in the field. I understand that not all of these factors will necessarily be relevant in a given case.

2

B.   Patent Claims and Claim Construction

10.   I understand that terms used in patent claims are not construed in the abstract, and that a claim receives the meaning it would have to persons in the field of the invention, when read and understood in light of the entire specification and prosecution history. *Fenner Investments, Ltd. v. Cellco Partnership*, 778 F.3d 1320, 1322-23 (Fed. Cir. 2015). I understand that to give meaning to a claim, one first considers the words of the claims themselves, and considers also the remainder of the specification, the prosecution history, and extrinsic evidence concerning relevant scientific principles, the meaning of technical terms, and the state of the art. *Phillips v. AWH Corp.*, 415 F.3d 1303, 1314 (Fed. Cir. 2005).

11.   I understand that a continuation-in-part application contains a portion or all of the disclosure of an earlier application and also adds matter not present in that earlier application. *PowerOasis, Inc. v. T-Mobile USA, Inc.*, 522 F.3d 1299, 1304 (Fed. Cir. 2008).

IV.   SUMMARY OF OPINIONS

12.   I understand that Respondents, Sonos, and Staff have proposed the following constructions for the "LAN" claim term that I was asked to analyze:

Respondents' Proposal	Sonos' Proposal	Staff's Proposal
Plain and ordinary meaning; no construction necessary	"data network that links devices within a limited area, such as a home or office"	Plain and ordinary meaning; no construction necessary

13.   I also understand that the parties have submitted these same constructions for all four of the patents at issue in this declaration (i.e., the '258, '953, '896, and '949 patents).

14.   As explained in more detail below, I agree with Respondents and Staff that LAN should be given its plain and ordinary meaning and that no construction is necessary.

V.   LEVEL OF ORDINARY SKILL IN THE ART

15.   I understand that Respondents contend that a person of ordinary skill in the art in

3

the '258, '953, '896, and '949 patents at the time of the alleged invention would have had the equivalent of a four-year degree from an accredited institution (typically denoted as a B.S. degree) in computer science, computer engineering, electrical engineering, or an equivalent thereof, and approximately 4 years of professional experience in the fields of networking and network-based systems or applications, such as consumer audio systems, or an equivalent level of skill, knowledge, and experience. A person with slightly less technical education but slightly more practical experience, or more technical education (e.g., a Master degree in the same fields) but less practical experience (e.g., 2 years), could have met that standard.

16.   I understand that Sonos asserts that "a person of ordinary skill in the art for purposes of this Investigation is a person having the equivalent of a four-year degree from an accredited institution (typically denoted as a B.S. degree) in computer science, computer engineering, electrical engineering, or an equivalent thereof, and approximately 2-4 years of professional experience in the fields of networking and network-based systems or applications, such as consumer audio systems, or an equivalent level of skill, knowledge, and experience." *See* Sonos' Response to Interrogatory No. 37.

17.   Under either formulation, my opinions expressed in this declaration apply equally.

VI.   LOCAL AREA NETWORKS ("LANS")

18.   A person of ordinary skill in the art would have understood that the term LAN, in the context of these patents, has its plain and ordinary meaning. That is, a network that allows for communication amongst two or more devices in a geographically limited area (generally one building or a group of buildings). A person of ordinary skill in the art would not interpret LAN to provide other limitations on the network. For example, a person of ordinary skill in the art would not understand LANs to be limited by the type of information communicated on the network (nor how that communication was communicated) as compared with the broader term "network."

4

19.   This plain and ordinary meaning of LAN to refer to a network that is limited by area (and not other characteristics) is evidenced by numerous technical dictionaries published around the time of the alleged inventions. For example, *Webster's New World Computer Dictionary, 10th Edition* (2003) defines LAN as "[a] computer network that uses cables or radio signals to link two or more computers in a geographically limited area (generally one building or a group of buildings)." Ex. 1; *see also* Ex. 2 (*Webster's New World Dictionary of* Computer *Terms, Eighth Edition* (2000)) ("defining LAN as "[a] computer network that physically links two or more computers within a geographically limited area (generally one building or a group of buildings)"); Ex. 3 (*Comprehensive Dictionary of Electrical Engineering, Second Edition* (2005)) (defining LAN as "[a] network of computers and connection devices (such as switches and routers) that are located on a single site. The connections are direct cables (such as UTP or optical fiber) rather than telecommunication lines. The computer network in a university campus is typically a local area network."); Ex. 4 (*Newton's Telecom Dictionary, Nineteenth Edition* (2003)) (defining LAN as "[a] short distance data communications network (typically within a building or campus) used to link computers and peripheral devices (such as printers, CD-ROMs, modems) under some form of standard control"); Ex. 5 (*The Dictionary of Multimedia, Fourth Edition* (2005)) (defining LAN as "[a]ny physical network technology that operates at high speeds over short distances, such as several thousand yards"); Ex. 6 (*Computer & Internet Dictionary, Third Edition* (1999)) (defining LAN as "[a] computer network that spans a relatively small area. Most LANs are confined to a single building or group of buildings"); Ex. 7 (IEEE Standard for Local and Metropolitan Area Networks, Std. 802-2001 (2002)) at 1 (defining LAN as covering "a moderate-sized geographic area, such as a single office building, a warehouse, or a campus"); Ex. 8 (University of British Columbia's Presentation titled "Deploying the World's Largest Campus 802.11b Network" (dated November 11, 2003; available at http://www.ieee802.org/802_tutorials/03-

5

November/www.wireless.ubc.ca-IEEE-Nov2003.ppt) at 4 (describing a LAN, using the 802.11b

WLAN standard, that covers "150 buildings.").

20.   Many network types are defined based on other geographic area. For example, a

person of ordinary skill in the art would be familiar with the concepts of PAN, LAN, MAN and

WAN, meaning personal area network, local area network, metropolitan area network and wide

area network, respectively. A PAN is typically viewed as having a maximum range that is

generally around a person's body. This may also be thought of as being consistent with a

moderately sized room, office or a vehicle's cabin. A LAN has a maximum range that generally

covers a portion of a building, a building, multiple buildings or a campus. A MAN covers a city

or a portion of a city. A WAN covers a large area such as multiple cities, a state, country or globe.

21.   As a person of ordinary skill in the art would have understood, a LAN can be

implemented via various technologies. For example, *The Dictionary of Multimedia, Fourth Edition*

(2005) explains that "[t]echnologies that play roles in a LAN include Ethernet, token ring,

Asynchronous Transfer Mode (ATM), Fiber Distributed Data Interface (FDDI) II, 10Base-T, and

Systems Network Architecture (SNA)." Ex. 5. It further explains that "[t]he system of cables and

interfaces controlled by a communications protocol that connects microcomputers for sharing

resources and peripherals is all part of the LAN," and that "[c]onnection is also possible with an

infrared or wireless link." *Id.* As another example, *Webster's New World Computer Dictionary,*

10th Edition (2003) explains:

> LANs are differentiated by their architecture (peer-to-peer or
> client/server), topology (bus, hierarchical, multipoint, point-to-
> point, ring, or star), protocols (standards for transferring data among
> the linked workstations), and media (for instance, coaxial, twisted-
> pair, and fiber optic). Peer-to-peer LANs are simple to implement
> using the built-in networking capabilities of computers running
> Microsoft Windows or Mac OS; such networks enable the linked
> computers to share expensive peripherals such as laser printers;
> client/server networks use a LAN server to make centralized

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> resources (such as databases and applications) available to workstation users. Network protocols operate at differing layers; for example, Ethernet is a lower-layer protocol that defines the basic mechanisms by which data enters the network and travels to its destination; Ethernets can work with a variety of higher-level protocols, including AppleTalk, Common Internet File System (CIFS), and TCP/IP.

Ex. 1 (emphasis added). Similarly, as *Webster's New World Dictionary of Computer Terms, Eighth Edition* (2000) explains:

> Peer-to-peer LANs enable the linked computers to share expensive peripherals such as laser printers; client/server networks use a LAN server to make resources (such as databases and applications) available to workstation users. Local area networks have a characteristic topology (such as bus, ring, or star) and ***implement one or more networking protocols (such as Apple Talk, Ethernet, or TCP /IP)***.

Ex. 2 (emphasis added). All of these descriptions are consistent with my understanding and with what a person of ordinary skill in the art would have understood at the time of the alleged inventions.

22.   Note that a person of ordinary skill in the art would also have understood that many of these various technologies can be used for LANs that extend beyond a single home or office.

23.   A person of ordinary skill in the art would have also understood that a LAN is not limited to connecting "computers" and instead may enable communication by other types of electronic devices on the network. *See, e.g.*, Ex. 9 (*Microsoft Computer Dictionary, Fifth Edition* (2002)) (defining LAN as "[a] group of computers ***and other devices*** dispersed over a relatively limited area and connected by a communications link that enables ***any device to interact with any other on the network***") (emphasis added).

24.   I understand that Sonos does not dispute that a LAN is not limited to communication between "computers" and instead may enable communication between all other types of devices linked on the network, because Sonos' proposed construction for the term LAN

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(i.e., "***data network that links devices*** within a limited area, such as a home or office") also uses the term "devices" and not the term "computers."

A.   **"Data Networks"**

25.   Sonos' proposed construction, on its face, does not appear substantively different from the plain and ordinary meaning of the term. Sonos proposed that LAN means "data network that links devices within a limited area, such as a home or office."[1] Sonos agrees that LANs are limited to be "within an area."

26.   Sonos' proposed construction adds the term "data" in front of "network." Data has a well understood plain and ordinary meaning that generally means "information." For example, the *Modern Dictionary of Electronics, Seventh Edition* (1999) (Ex. 10) provides several definitions of data, none of which materially limit "data" in the context of the four patents at issue here:

> 1. A general term used to denote any or all numbers, letters, symbols, or facts that refer to or describe an object, idea, condition, situation, or other factors. It connotes basic elements of information that can be processed or produced by a computer. Sometimes data is considered to be expressible only in numerical form, but information is not so limited.
> 2. A general term for any type of information.
> 3. Inputs in the form of a character ,string that may have significance beyond their numerical meaning.
> 4. Any representations, such as characters or analog quantities, to which meaning might be assigned.

Ex. 10. *See also* Ex. 11 (*McGraw-Hill Dictionary of Scientific and Technical Terms, Sixth Edition* (2003)) (defining "data" as: "1. General term for numbers, letters, symbols, and analog quantities that serve as input for computer processing. 2. Any representations of characters or analog

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[1]   I do not interpret Sonos' proposed construction to geographically limit the area of a LAN to ***only*** "a home or office" because the construction uses exemplary language "such as." To the extent that Sonos attempts to limit the area of a LAN to a single office or home, I disagree. LANs can span buildings, office complexes, and larger areas than that of a single home or office, as explained in this declaration.

quantities to which meaning, if not information, may be assigned."); Ex. 4 (*Newton's Telecom Dictionary, Nineteenth Edition* (2003)) (defining "data" as "[a] representation of facts, concepts or instructions in a formalized manner, suitable for communication, interpretation or processing"); Ex. 12 (*Dictionary of Computer and Internet Terms, Ninth Edition* (2006)) (defining "data" as "information").

27.   Therefore, a person of ordinary skill in the art would not understand "data networks" to materially different from "networks" in this context. "Data networks" are simply networks that communicate data.

B.   "Digital Data Packets"

28.   While the plain and ordinary meaning of "data networks" does not render Sonos' proposed construction objectionable, Dr. Almeroth and Dr. Weissman both apply a specialized meaning to "data networks" that is incorrect. Dr. Almeroth opines that the "data network" is limited to "a network that transfers digital data packets between devices." Almeroth Decl. ¶ 52. Dr. Weissman opines that the "data network" is limited to "a network for transferring digital data packets between devices." Weissman Decl. ¶ 40. A person of ordinary skill in the art would not understand "data network" to be so limited. Dr. Almeroth and Dr. Weissman's construction of "data network" limits "data" and "LAN" to "digital data," and even more narrowly to "digital data packets." This is improper and contrary what a person of ordinary skill in the art would understand these terms to mean.[2]

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[2]   I understand that the term "data network" appears in agreed constructions for other terms, including "zone player," "playback device," "player," and "network interface." I understand that Sonos has not asserted that "data network" should be construed with the specialized construction introduced by Drs. Almeroth and Weissman. In any event, for the same reasons identified here, a person of ordinary skill in the art would understand the term "data network" to have its plain and ordinary meaning, and not the narrow construction proposed by Drs. Almeroth and Weissman.

29.   Data can be represented in both digital and analog form. As further discussed in Section VI.C, the definition of "data" is broad and not limited to one specific type of data, such as data represented digitally. Indeed, a person of ordinary skill would certainly know that data includes both digital and analog types of data. Not surprisingly, "digital data" and "analog data" are common and often used terms.

30.   Digital data is "[d]ata represented in discrete, discontinuous form, as contrasted with analog data represented in continuous form." Ex. 10 (*Modern Dictionary of Electronics, Seventh Edition* (1999)); *see also* Ex. 11 (*McGraw-Hill Dictionary of Scientific and Technical Terms, Sixth Edition* (2003)) (defining "digital data" as "[d]ata that are electromagnetically stored in the form of discrete digits"); Ex. 4 (*Newton's Telecom Dictionary, Nineteenth Edition* (2003)) (defining "digital signal" as: "A discontinuous signal. One whose state consists of discrete elements, representing very specific information. When viewed on an oscilloscope, a digital signal is 'squared.' This compares with an analog signal which typically looks more like a sine wave, i.e. curvy.").

31.   "Analog data" is "[d]ata represented in a continuous form, as contrasted with digital data represented in a discrete (discontinuous) form." Ex. 10 (*Modern Dictionary of Electronics, Seventh Edition* (1999)); *see also* Ex. 3 (*Comprehensive Dictionary of Electrical Engineering, Second Edition* (2005)) (defining "analog data" as "data represented in a continuous form with respect to continuous time, as contrasted with digital data represented in a discrete (discontinuous) form in a sequence of time instant"; and defining "analog signal" as "a signal represented in a continuous form with respect to continuous time, as contrasted with digital signal represented in a discrete (discontinuous) form in a sequence of time instant"); Ex. 11 (*McGraw-Hill Dictionary of Scientific and Technical Terms, Sixth Edition* (2003)) (defining "analog data" as "[d]ata represented in a continuous form, as contrasted with digital data having discrete values"; and

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defining "analog signal" as "[a] nominally continuous electrical signal that varies in amplitude or frequency in response to changes in sound, light, heat, position, or pressure"); Ex. 4 (*Newton's Telecom Dictionary, Nineteenth Edition* (2003)) (defining "analog signal" as "[a] signal in the form of continuous wave varying in step with the actual transmitted information; attempts to transmit on exact replica of the inputted signal down a communications channel").

32.   A person of ordinary skill in the art would not understand the plain and ordinary meaning of "data network" in the four patents at issue here to exclude analog data. *See, e.g.*, U.S. Patent Application Publication No. US2003/0087636 (Ex. 21) at [0027] ("The embedded system may be capable of accessing various types of WANs, like a connection to a digital network or analog data network."); U.S. Patent No. 6,829,603 (Ex. 22) at 7:17-23 ("Such a session is maintained by a network interface 140 connecting to one or more of the following: the Internet 145, an intranet, a local area network, a public service telephone network, a wireless cellular network, a cable network, a satellite communications network or any other private or public digital or analog data network.").

33.   In addition, the four patents at issue here deal with audio data. A person of ordinary skill in the art would also understand that audio could be either digital or analog data. *See, e.g.*, U.S. Patent No. 6,879,865 (Ex. 14) at claim 1 ("A system for converting audio digital data to audio analog data…"); U.S. Patent No. 5,893,900 (Ex. 15) at Abstract ("An analog audio recording device comprises a data receiver for receiving analog audio data and a plurality of analog markers, an analog output for outputting the analog audio data with the plurality of analog markers…"); U.S. Patent No. 8,918,546 (Ex. 16) at 4:30-32 ("As indicated in FIG. 1, this analog audio data may be provided as separate left (L) and right (R) analog audio signals."); U.S. Patent Application Publication No. 2002/0118763 (Ex. 17) at claim 14 ("wherein the analog data signal comprises an audio signal").

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34.   Putting aside the issue of digital versus analog, Dr. Almeroth and Dr. Weissman's narrowing of the type of data to only "packets" is also improper. "Packets" "[i]n the generic sense, refer[] to the manner in which data are organized into discrete units for transmission and switching through a data network." Ex. 13 (*Webster's New World Telecom Dictionary* (2008)); *see also* Ex. 11 (*McGraw-Hill Dictionary of Scientific and Technical Terms, Sixth Edition* (2003)) (defining "packet" as "[a] short section of data of fixed length that is transmitted as a unit"); Ex. 1 (*Webster's New World Computer Dictionary, 10th Edition* (2003)) (defining "packet [i]n networking as "a unit of data of a fixed size—not exceeding the network's maximum transmission unit (MTU) size—that has been prepared for transmission over a packet-switching network"). A person of ordinary skill in the art would not understand the plain and ordinary meaning of "LAN" or "data networks" to be limited to only communicating data in packets.

C.   Dr. Almeroth and Dr. Weissman's Misinterpretation of the Extrinsic Evidence They Cite

35.   Dr. Almeroth and Dr. Weissman cite to dictionary definitions in their declarations. These definitions support the plain and ordinary meaning of LAN as described above in Sections VI.A-C.

36.   Like myself, Dr. Almeroth and Dr. Weissman cite to the Modern Dictionary of Electronics (7th ed. 1999), which defines "local area network" as "[a] data communications network spanning a limited geographical area, such as an office, an entire building, or industrial park." *See* Almeroth Decl. ¶ 56; Weissman Decl. ¶ 42. As the definition plainly states, a LAN is a data communications network and the Modern Dictionary of Electronics does not further limit the data to "digital data" or "digital data packets."

37.   Dr. Almeroth and Dr. Weissman also cite to The Telecommunications Illustrated (2nd ed. 2002), which defines "local area network" as "[a] computer network within a specified

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geographical space, such as a building or region, or within an institutional entity such as a classroom or department." *See* Almeroth Decl. ¶ 57; Weissman Decl. ¶ 42. Dr. Almeroth and Dr. Weissman also cite to the Google dictionary that defines the term "local area network" as "a computer network that links devices within a building or group of adjacent buildings." *See* Almeroth Decl. ¶ 60; Weissman Decl. ¶ 42. As with the other dictionary definitions, there is no limitation to "digital data" or "digital data packets" here. Dr. Almeroth and Dr. Weissman assert that "computer network" means "data network" but a computer network is not limited to "digital data" or "digital data packets" either. *See* Almeroth Decl. ¶ 57; Weissman Decl. ¶ 42. Indeed, the *Modern Dictionary of Electronics, Seventh Edition* (1999) defines "computer network" as simply "[t]wo or more connected computers that have the ability to exchange information." Ex. 10. The "information" is not limited to "digital data packets."

38.   Neither Dr. Almeroth nor Dr. Weissman cite any dictionary definitions that include the word "digital."

39.   Only two cited books even mention the word "packet" in the description of LAN. One is the Packet Broadband Network Handbook (2004). *See* Almeroth Decl. ¶ 57; Weissman Decl. ¶ 42. Because this Handbook is all about Packet Broadband Networks, it is no surprise that the Handbook would describe LANs in the context of packet networks. A person of ordinary skill in the art would not take a description of LAN from a handbook about packet networks as a description of LAN for other types of networks. The second book is the Webster's New World Telecom Dictionary (2008) that describes "local area network" as "a packet network designed to interconnect host computers, peripherals, storage devices, and other computing resources within a local area, i.e., limited distance."). *See* Almeroth Decl. ¶ 59; Weissman Decl. ¶ 42. In my experience, it is not unusual that some definitions of technical terms may inadvertently limit the terms from their plain and ordinary meanings. The fact that there is only one dictionary out of the

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many others cited by myself and Sonos' experts supports my opinion that, while LANs can be packet networks, not all LANs need to be packet networks.

VII.   THE PATENTS-AT-ISSUE

40.   As I explain in more detail below, none of the four patents at issue warrant departing from the plain and ordinary meaning of LAN, much less adopting the narrow, specialized constructions of Dr. Almeroth and Dr. Weissman.

A.   "Local Area Network" (LAN) in the '258/'953 Patents

41.   In my opinion, neither of these patents or their prosecution histories ascribe any special meaning to the term LAN. Neither the term "local area network" nor "LAN" appear anywhere in the specification of the '258 and '953 patents. These terms appear in only the claims. A person of ordinary skill in the art would have understood that the term LAN, in the context of these patents, has its plain and ordinary meaning to one of ordinary skill in the art.

42.   For the reasons I explain in Section VI, by defining a "data network" as "a network that transfers *digital data packets* between devices," Sonos and Dr. Almeroth seek to improperly read in a negative limitation that the LAN cannot communicate *analog* or *non-packetized* information. As indicated by both the intrinsic and extrinsic evidence, this is not correct and is not how a person of ordinary skill in the art would have understood the term LAN in the context of the '258 and '953 claims and patents.

43.   The intrinsic evidence does not narrow or otherwise disclaim the scope of "LAN" to transferring *only* "digital data packets between devices." Indeed, the claims require only a "local area network." These patents do not recite that the "local area network" transfers "digital data packets between devices," nor does this patent contain the words "digital" or "packet." In my opinion, the absence of the terms "digital" and "packet" to restrict the network in the plain language of the claims is strong evidence *against* reading in the requirement that the claimed LAN

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is restricted to transferring *only* "digital data packets," at the exclusion of other types of data such as analog data or non-packetized data.

44.   Dr. Almeroth opines that the claims include other elements (e.g., "zone player," "network interface") that indicate that the claims are limited to a "data network." However, as I explain above in Section VI, a "data network" is not limited to a *digital* data nor does it exclude analog data. Indeed, I understand that the parties have agreed that "zone player" should be construed as a "data network device configured to process and output audio," and "network interface" should be construed as a "physical component of a device that provides an interconnection with a data network." Although both of these agreed-upon constructions use the term "data network," neither includes the term "*digital*" that Sonos and Dr. Almeroth seek to inject into the construction of LAN.

45.   The specification likewise does not restrict the claimed LAN to transferring *only* "data packets" and *excluding* non-packetized data. Like in the claims, the term "data packet" does not appear in the specification, let alone the term "digital data packet." And the specification never excludes non-packetized data from the LAN.

46.   To the contrary, with respect to analog data, the specification makes numerous references to analog signals and never states that such signals/data cannot be transmitted via the LAN. For example, the specification explains that audio information sources "16(m) may be any of a number of types of conventional sources of audio information, including, for example, compact disc ('CD') players, AM and/or FM radio receivers, *analog* or digital tape cassette players, *analog* record turntables and the like" ('258 patent at 4:51-55; '953 patent at 4:56-60) (emphasis added), and that "each audio information source 16(m) that is not directly connected to a zone player can transmit *audio information over the network 12* to any zone player 11(n) for playback" ('258 patent at 5:17-20; '953 patent at 5:22-25) (emphasis added). The specification

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does not state that any of these analog signals are required to be converted to digital before being transmitted via the LAN much less state a prohibition on doing so. Sonos and Dr. Almeroth's construction thus not only injects an unclaimed requirement into the claims, but it also injects an *undisclosed* requirement into the claims. This is not how a person of ordinary skill in the art would have understood the patents and claims (or the term LAN in the context of the claims and patents).

47.   In addition, as explained above, a "local area network" is a network over a geographically limited area, and the '258 and '953 patents acknowledge that there is nothing inherently digital in the word "network." For example, the patents discuss a "public switched telephony network (PSTN)." '258 patent at 4:14-21; '953 patent at 4:18-22. One of ordinary skill in 2004 would have understood that the term "public switched telephony network" refers to a network where sound waves (i.e., audio) are modulated onto electrical circuits, making these networks fundamentally analog. In fact, this remains true even today for a significant number of last mile portions of these networks. Nonetheless, the '258 and '953 patents consider these analog networks examples of "other networks" and thus within the scope of the term "network." The patents even disclose that a "network interface device" (another claim term) can interface with such analog networks. *Id*. It is my understanding that the private parties and the Staff previously agreed that a "network interface" is a "physical component of a device that provides an interconnection with a data network." The '258 and '953 patents thus use terms such as "network" and "data network" to encompass networks that transmit data (including audio) in analog form. The same is true for "local area network."

48.   With respect to non-packetized data, although the specification discusses "packets" (in connection with audio buffers) that can be transmitted across the LAN, it never excludes other non-packetized data from being communicated on the LAN. As a person of ordinary skill in the art would have understood, a LAN can include both packetized and non-packetized data, and the

patents do not express any reason, technical or otherwise, for restricting the LAN to packetized data only. Again, Sonos and Dr. Almeroth's construction improperly injects an unclaimed requirement into the claims.

49.   I also note that contrary to Dr. Almeroth's assertion, the specification does not "repeatedly and uniformly describe[] that the communications over the 'local network' are in the form of digital data 'packets.'" Almeroth Decl. ¶ 72; *see also id.* at ¶ 73 ("Thus, by repeatedly and consistently describing that the 'local network' transfers digital data 'packets,' the common specification of the '258 and '953 patents provides further support for my opinion that the claimed 'local area network' is a data network."). As I mentioned, the specification does not once mention the term "data packet(s)," much less the term "digital data packet(s)." As I also discussed above, the specification never states that the disclosed analog audio information is precluded from being transmitted on the claimed LAN, or that non-packetized data (such as continuous form analog audio information) is precluded from being transmitted on the claimed LAN, and thus does not "uniformly" or "consistently" describe the LAN as transmitting "digital data packets." Again, Sonos and Dr. Almeroth's construction improperly reads in a negative limitation that the LAN cannot communicate analog or non-packetized information.

50.   Accordingly, in my opinion, a person of ordinary skill in the art would have understood that the term "local area network" in the context of the '258 and '953 patents to be given its plain and ordinary meaning.

1.   The '258 and '953 Patents Do Not Restrict LAN to "a Home or Office"

51.   To the extent that Sonos and Dr. Almeroth argue that the '258 and '953 patents limit a LAN to a single home or office, I disagree. The intrinsic record of these patents confirms that a LAN may include multiple buildings. For example, these patents refer to a LAN spanning an "office complex," which indicates more than one building. For example:

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- "On the other hand, if *the zone players* 11(n) and their associated audio information source(s) and/or audio reproduction device(s) *are distributed throughout an office complex*, one may for example, be provided in each office to selectively provide entertainment to the employees in the respective offices." '258 patent at 4:34-40; see also '953 at 4:39-44.

- "The zone players 11(n) associated with system 10 may be distributed throughout an establishment such as a residence, *an office complex*, a hotel, a conference hall, an amphitheater or auditorium, or other types of establishments as will be apparent to those skilled in the art or the like." '258 patent at 4:22-26; '953 at 4:26-30.

52.   The inventors thus made clear that the scope of the coverage area that is also taught to be accessible via LANs can include office complexes. Of course, a "complex" is a group of similar buildings or facilities on the same site. *See, e.g.*, Ex. 18 (*The Oxford Dictionary of American English* (2005)) (defining a "complex" as "a group or set of things, especially buildings, designed for a particular purpose: *a high-rise apartment complex*"); Ex. 19 (*Longman Dictionary of American English, Third Edition* (2004)) (defining a "complex" as "a group of buildings or one large building used for a particular purpose: *a new shopping complex*"); Ex. 20 (*Merriam-Webster's Collegiate Dictionary, Eleventh Edition* (2005)) (defining a "complex" as "a building or group of buildings housing related units <an apartment ~> <a sports ~>"). This would include an office complex with multiple buildings. Another example is an apartment complex with multiple buildings. Therefore, the intrinsic record itself makes clear that a LAN, the medium described as being used by the patents, extends to multiple buildings.

53.   Accordingly, in my opinion, a person of ordinary skill in the art would have understood that the term "local area network" in the context of the '258 and '953 patents is not limited to "a home or office."

B.   "Local Area Network" (LAN) in the '896 Patent

54.   In my opinion, neither the '896 patent nor its prosecution history ascribes any special meaning to the term LAN. A person of ordinary skill in the art would have understood that

the term LAN, in the context of the patent, has its plain and ordinary meaning to one of ordinary skill in the art.

55.   For the reasons I explain in Section VI above, by defining a "data network" as "a network for transferring digital data packets between devices," Sonos and Dr. Weissman seek to improperly read in a negative limitation that the LAN cannot communicate *analog* or *non-packetized* information. As indicated by both the intrinsic and extrinsic evidence, this is not correct and is not how a person of ordinary skill in the art would have understood the term LAN in the context of the '258 and '953 claims and patents.

56.   The specification does not restrict the claimed LAN to transferring "digital data packets." The '896 patent includes similar disclosures to the '258 and '953 patents. I have already explained that those disclosures support applying the plain and ordinary meaning of LAN, and my explanations apply equally here. For example, the term "data packet" does not appear in the specification, let alone the term "digital data packet." To the contrary, the specification allows for embodiments where the LAN includes analog devices. I incorporate those same arguments here where similar language appears in the '896 patent.

57.   Additionally, consider Figure 1 of the '896 patent, which depicts "network 108":

FIG. 1
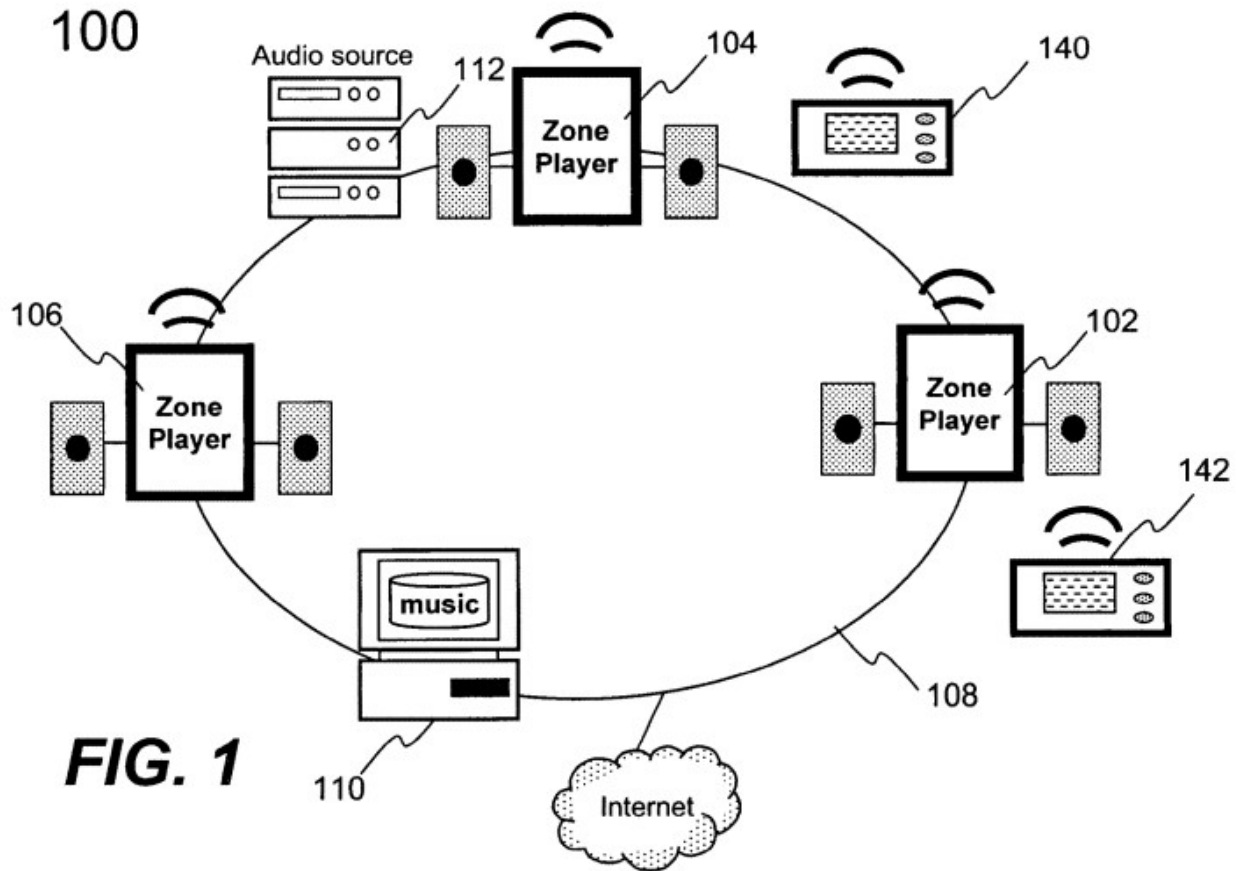
58.   Network 108 includes "stereo system" 112, which "is configured to receive an analog source (e.g., from broadcasting) or retrieve a digital source (e.g., from a compact disk)." '896 patent at 6:13-16. The '896 patent goes on to explain in the next sentence that "[t]he analog sources *can be* converted to digital sources" (*id.* at 6:16-17 (emphasis added)), which means that they do not *have to be* converted to digital source. The '896 patent then states in the following sentence that "[i]n accordance with the present invention, *all audio sources, regardless of where they are located or how they are received, may be shared among the devices on the network 108*." *Id.* at 16:17-20. Dr. Weissman's narrowing of LAN to transmitting only "digital data packets" would effectively read out this permissive, broad language.

59.   As I discussed in connection with the '258 and '953 patents, the extrinsic evidence similarly shows that a LAN is not limited to transferring "*digital* data packets" because "data,"

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including "audio data," may be represented in analog as well as digital form. *See* Section VI above.

60.   Accordingly, in my opinion, a person of ordinary skill in the art would have understood that the term "local area network" in the context of the '896 patent to be given its plain and ordinary meaning.

1.   The '896 Patent Does Not Restrict LAN to "a Home or Office"

61.   To the extent that Sonos argues that the '896 patent limits a LAN to a single home or office, I disagree. Like the '258 and '953 patents, the '896 patent also refers to complexes, in this case, "living complexes":

- "The configuration may represent, but not be limited to, a part of a residential home, a business building or *a living complex* with multiple zones." '896 at 5:44-46.

- "[T]he controlling devices 140 or 142 is configured to manage audio sources and other characteristics of all the zone players regardless where the controlling device 140 or 142 is located in a house or a confided *living complex*." '896 at 6:28-33.

- "The controller 240 may be used to facilitate the control of multi-media applications, automation and others in a *living complex*." '896 at 7:28-30.

62.   The inventors thus made clear that the scope of the coverage area that is also taught to be accessible via LANs can include living complexes. As I mentioned in Section VII.A.1 above, a "complex" is a group of similar buildings or facilities on the same site. This would include a living complex with multiple buildings or an apartment complex with multiple buildings. Therefore, the intrinsic record itself makes clear that a LAN, the medium described as being used by the patent, extends to multiple buildings.

63.   Accordingly, in my opinion, a person of ordinary skill in the art would have understood that the term "local area network" in the context of the '896 patent is not limited to "a home or office."

C.   "Local Area Network" (LAN) in the '949 Patent

64.   In my opinion, neither the '949 patent nor its prosecution history ascribes any

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special meaning to the term LAN. A person of ordinary skill in the art would have understood that the term LAN, in the context of the patent, has its plain and ordinary meaning to one of ordinary skill in the art.

65.   For the reasons I explain in Section VI above, by defining a "data network" as "a network for transferring digital data packets between devices," Sonos and Dr. Weissman seek to improperly read in a negative limitation that the LAN cannot communicate *analog* or *non-packetized* information. As indicated by both the intrinsic and extrinsic evidence, this is not correct and is not how a person of ordinary skill in the art would have understood the term LAN in the context of the '258 and '953 claims and patents.

66.   The intrinsic evidence does not narrow or otherwise disclaim the scope of "LAN" to transferring *only* "digital data packets between devices." Indeed, the claims require only a "local area network." The '949 patent does not recite that the "local area network" transfers "digital data packets between devices," nor do these patents contain the words "digital" or "packet." In my opinion, the absence of the terms "digital" and "packet" to restrict the network in the plain language of the claims is strong evidence *against* reading in the requirement that the claimed LAN is restricted to transferring *only* "digital data packets," at the exclusion of other types of data such as analog data or non-packetized data.

67.   The claims require that the playback devices are "configured to playback a multimedia output from a multimedia source," but do not recite that the claimed "multimedia source" must be digital.

68.   I have reviewed the rest of the claims of the '949 patent, and none support the proposition that the claimed "local area network" may only be a digital network.

69.   The specification likewise does not require that the claimed "local area network" must be a digital network. The specification expressly teaches that the player devices may receive

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analog data. In a disclosed embodiment concerning "a zone group" of playback devices, "the zone player 200 is caused to retrieve an audio source from another zone player ***or a device on the network***." '949 patent at 6:4-12 (emphasis added). That device could be an ***analog*** device "configured to receive an analog audio source (e.g., from broadcasting)." *Id.* at 5:25-27. That analog source "may be shared among the devices on the network 108," *id.* at 5:29-31, including the zone players, which possess an "audio processing circuit" that "may include necessary circuitry to process analog signals as inputs." *Id.* at 6:31-34; *id.* at 6:26-37 (teaching that "an audio source is retrieved via the network interface 202"). Further, the patent's "Summary Of The Invention" section discloses a multitude of embodiments. One calls for the player group to play media "in a digital format," *id.* at 3:28-39, while the others do not specify whether the audio received and played by the players is analog or digital, *e.g.*, *id.* at 2:28-37, 2:49-54, 2:55-64, 3:4-15, 3:16-27.

70.   Additionally, consider Figure 1 of the '949 patent, which is the same as Figure 1 in the '896 patent and depicts "network 108":

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FIG. 1
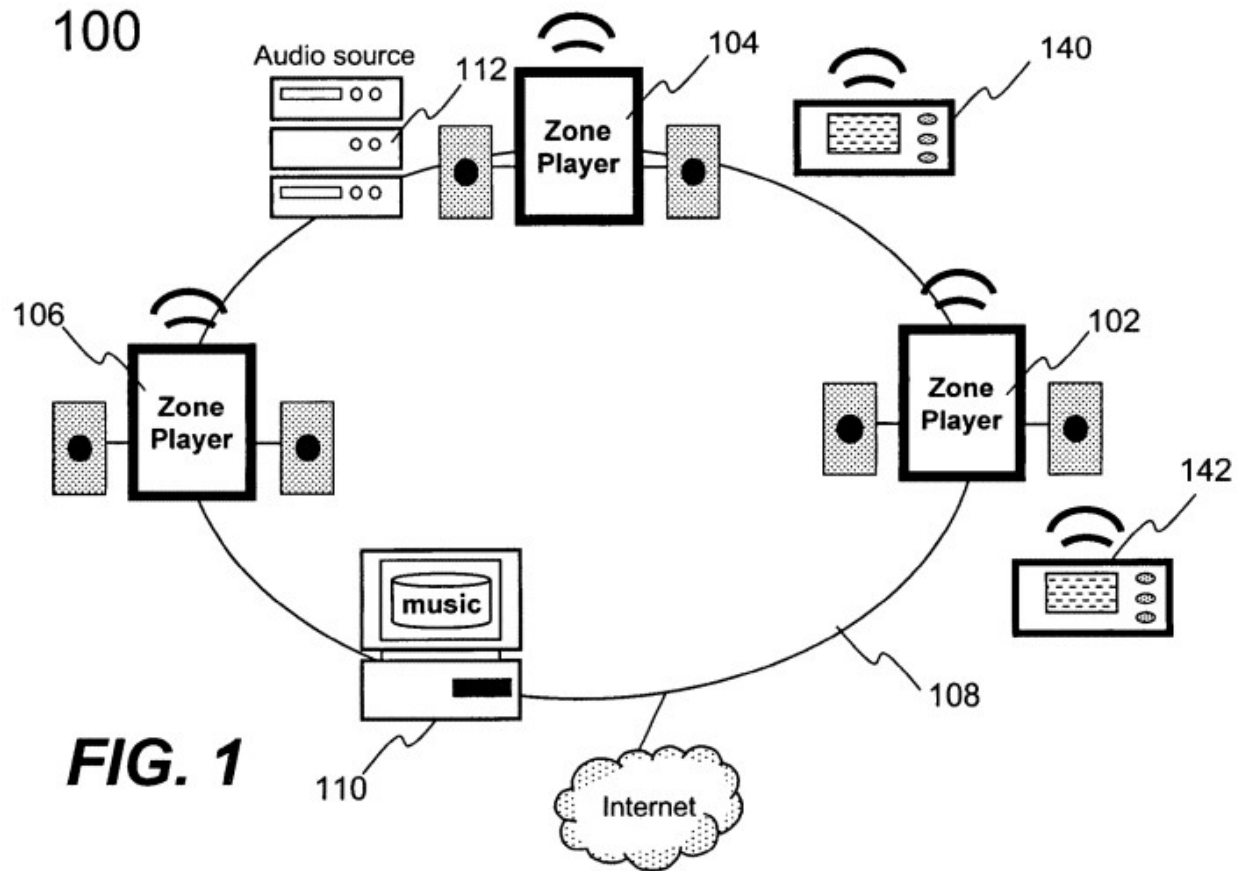
71.   Network 108 includes "stereo system" 112, which "is configured to receive an analog source (e.g., from broadcasting) or retrieve a digital source (e.g., from a compact disk)." '949 patent at 5:25-31. The '949 patent goes onto explain in the next sentence that "[t]he analog sources *can be* converted to digital sources" (*id.* at 5:28-29 (emphasis added)), which means that they do not *have to be* converted to digital source. The '949 patent then states in the following sentence that "[i]n accordance with the present invention, *all audio sources, regardless of where they are located or how they are received, may be shared among the devices on the network 108*." *Id.* at 5:29-31. Dr. Weissman's narrowing of LAN to transmitting only "digital data packets" would effectively read out this permissive, broad language.

72.   Dr. Weissman cites to portions of the specification describing digital networks. *See, e.g.,* '949 patent at 5:5-15 (reciting 801.11 standard), 5:37-63 (reciting TCP/IP and 802.11

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protocols); 4:65-67 (noting that audio sources are "in digital format" "*unless explicitly stated otherwise*") (emphasis added). Because these are not the only teachings in the specification, and because the claim language does not recite a digital network, it is my opinion that the claims are not limited to these examples. This is particularly true because, as I detail in the preceding paragraph, the patent "explicitly states" that some players may have analog audio sources, and that the zone player may retrieve an audio source from another network device, *i.e.*, via analog network transmission.

73.   A comparison between the '949 patent and a related, parent application further demonstrates that the '949 patent does not exclude analog data. Below to the left is Fig. 3 from U.S. Ser. No. 10/816,217 ("the '217 application"), which issued as U.S. Pat. No. 8,234,395 (the "'395 patent"). The '949 patent is continuation of a continuation-in-part of a continuation-in-part of that '217 application, and uses a different block diagram to depict the player device. *Compare* '395 patent at 2:66-67 ("FIG. 3 depicts an functional block diagram of a zone player for use in the networked audio system depicted in FIG. 1.") *with* '949 patent at 3:59-60 ("FIG. 2A shows an exemplary functional block diagram of a player in accordance with the present invention."):
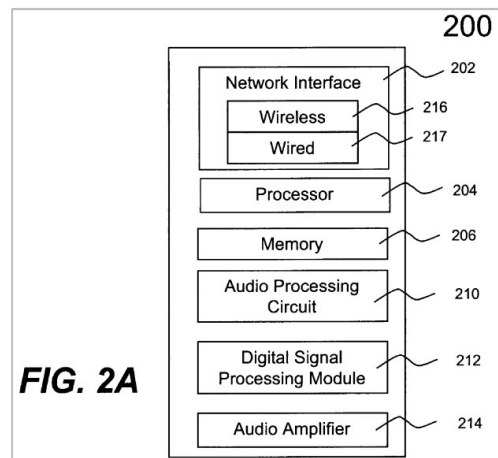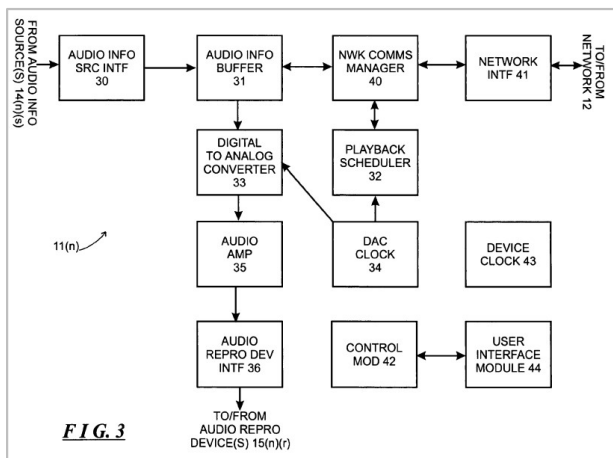
FIG. 3

FIG. 2A

74.   The absence of elements like the DAC Clock and Playback Scheduler from Fig. 2A of the '949 patent demonstrates that the '949 patent discloses players that receive and output analog

signals. This is in contrast to the player in Fig. 3 of the '395 patent, which include digital to analog converter. Both of these players can exist on the LAN of the '949 patent and further confirm that the "LAN" should not be narrowly construed to exclude analog data.

75.   While the '949 patent describes a digital-to-audio converter (DAC), *id.* at 6:22-34, this is only an embodiment and thus should not be read as a requirement into the claims. Further, the paragraph also discloses digital signal processors (DSPs), *id.* at 6:25-26, and DSPs can be used to perform functions like base and treble adjustment using digital filters. The DAC mentioned in the paragraph could be used after the DSP to convert the signal *back to analog* after performing processing with the DSP. So, even in the embodiment that shows a DAC, there are at least two reasons that the mention of "DAC" here does not imply that the data on the network had to be digital. Additionally, the disclosure of the DAC does not mention that the DAC times or logs its conversion providing further evidence that the '949 patent should not be limited to digital networks.

76.   It also makes little sense to limit the '949 patent to a digital data network because it is directed to a user-interface solution that is equally applicable to a digital or analog audio network. The '949 patent is directed to the "need for user interfaces that may be readily utilized to group and control the audio players," such as to allow users to easily swap between grouped and individual configurations and to control speaker volume. '949 patent at 2:13-17. The patent describes these user interfaces at length, including their ability to group, de-group, and adjust volume (2:21-3:29), design choices such as buttons, menu items, scroll wheels, and audio controls (6:61-7:36), and the specific UI flows that allow users to create and configure groups and themes (8:27-10-17; 10:30-11-52). Nothing in these teachings suggests, much less requires, that the claimed "local area network" be restricted to "digital data packets."

77.   Accordingly, in my opinion, a person of ordinary skill in the art would have

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understood that the term "local area network" in the context of the '949 patents to be given its plain and ordinary meaning.

1.   The '949 Patent Does Not Restrict LAN to "a Home or Office"

78.   To the extent that Sonos argues that the '949 patent limits a LAN to a single home or office, I disagree. Like the '258, '953 patents, and '896 patents, the '949 patent also refers to complexes, stating that the LAN may be "a part of a residential home, a business building or a complex with multiple zones." '949 patent at 4:58-60; *see also id*. at 6:43-45. Fig. 3B illustrates player devices outside the home, including the garden (outside the house) and garage (often a standalone structure). This is strong evidence against reading the '949 patent to exclude any network that extends beyond the home or office.

79.   Moreover, the patent's teachings are clearly applicable in even larger areas. As discussed, the claims are directed to a controller featuring a user interface that can be used to configure speakers capable of operating either individually or in a grouped configuration (for synchronous playback), and to control the volumes of such players. '949 patent at 3:40-45, claim 1. Absent some indication to the contrary, the claimed "local area network" is therefore most naturally read to include all LANs and not just a single home or office.

80.   Accordingly, in my opinion, a person of ordinary skill in the art would have understood that the term "local area network" in the context of the '949 patent is not limited to "a home or office."

VIII.   CONCLUSION

I, Matthew B. Shoemake, declare under penalty of perjury under the laws of the United States that the foregoing is true and correct.

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Dated: June 8, 2020

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Matthew B. Shoemake, Ph.D.

**CERTAIN AUDIO PLAYERS AND CONTROLLERS, COMPONENTS THEREOF,
AND PRODUCTS CONTAINING SAME**

Inv. No. 337-TA-1191

CERTIFICATE OF SERVICE

I, K. Kevin Chu, hereby certify that on June 8, 2020, copies of the foregoing documents

were served upon the following parties as indicated:

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